The Excess Profits and their Tax Revenue Potential

Evgeniya Dubinina[*], Javier Garcia-Bernardo[†], Petr Janský[‡§]

Abstract

The COVID-19 pandemic affected most companies' profits negatively, but some companies did exceptionally well, recording excess profits during the pandemic. In this paper, we estimate the scale of the excess profits and the tax revenue potential of an excess profits tax, an additional tax levied by governments on companies' excess profits. To estimate excess profits, we develop a trend-adjusted average earnings methodology. We apply the methodology to firm-level consolidated Orbis data to estimate that large multinational corporations with subsidiaries in the EU generated excess profits of $447 billion in 2020 (42% of their total profits in 2020). Using country-by-country reporting data, we estimate the excess profits arising from each EU member state and find that EU member states could together raise $6 billion with an excess profits tax of 10%.

Keywords: Excess Profit; Excess Profits Tax; COVID-19; Multinational Corporation; European Union

JEL: H25; L11; L25

[*]Evgeniya.Dubinina@fsv.cuni.cz; Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic; ORCiD: 0000-0003-2779-9935

[†]J.Garciabernardo@uu.nl; Department of Methodology and Statistics, Utrecht University, Utrecht, the Netherlands; ORCiD: 0000-0002-6119-1790

[‡]Petr.Jansky@fsv.cuni.cz; Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, Czech Republic; ORCiD: 0000-0001-6499-9923

[§]We acknowledge support from the Czech Science Foundation (CORPTAX, 21-05547M). This work was supported by the Cooperatio Program at Charles University, research area Economics. Evgeniya Dubinina acknowledges support from the Grant Agency of Charles University (GAUK, 130122). We also acknowledge support from the European Parliament's Left Group. We appreciate useful comments on an earlier version of this paper from Boris Bouzol-Broitman, Madalena Figueira, Miroslav Palanský, and Christian Scholz Alvarado.

1 Introduction

The COVID-19 pandemic caused an economic crisis and significantly reduced countries' tax revenues (Cerra et al., 2021). At the same time, large corporations in specific sectors increased their profits as a result of the pandemic (Hebous et al., 2022). For example, in the second quarter of 2020, US multinational corporations (MNCs) and small firms saw 39% and 85% declines in profits, respectively, whereas specific companies in industries like pharmacy, technology, utilities, and telecommunications were able to increase their earnings (Oxfam, 2020). Cerra et al. (2021) underline the need for massive public investments to recover from the COVID-19 pandemic.

To finance countries' economic recovery from the pandemic, politicians and experts have revived the idea of an excess profits tax: an additional tax levied by governments on corporations' excess profits. Taxes on excess profits, also known as windfall taxes, were first proposed to fund war efforts in the First World War, and were implemented by countries such as France, the United Kingdom, and the United States. In this paper, we refer to excess profits as fortuitous gains from an unanticipated event, such as the COVID-19 pandemic, when businesses had asymmetric effects on their profits (Hebous et al, 2022), and to excess profits tax as a one-off policy implemented retrospectively to finance economic recovery. In this study, we estimate the potential tax revenue gains from a tax on the excess profits of large MNCs.

We use the novel methodology and the best available data to estimate the scale of excess profits and related potential tax revenue gains for the European Union. In particular, we develop and use a trend-adjusted average earnings approach to estimate excess profits. We compare each company's profits in 2020 with average adjusted profits in the 2014–2019 period. Our methodological innovation consists of adjusting the average profits by the company's growth trend, which makes it more realistic.

We apply this new methodology to Bureau van Dijk's Orbis database as the best available data set for the EU member states. Specifically, we use consolidated data for all large MNCs with turnover above $100 million with subsidiaries in the European Union during the 2014-2020 period. We restrict the sample to MNCs with turnover above $100 million because profits are concentrated amongst the largest companies. We exclude companies without recent financial data and we exclude entities such as public authorities, states and governments from the data. We use standard NACE codes to classify business sectors. To estimate the potential tax revenue gains for each EU member state, we use country-by-country reporting data from the OECD to understand the share of profits from Orbis headquarter countries that is attributable to the EU member states.

We estimate that large MNCs made total excess profits of $447 billion in 2020 (42% of their total profits in 2020). We show that governments from the European Union could collect $6 billion excess profits tax revenue with a 10% excess profits tax rate. These research findings may be useful for policymakers addressing the question of how to finance economic recovery from the pandemic with a one-off tax on excess profits. Moreover, the same methodology could be used to estimate the potential tax revenue from excess profits to tackle financial consequences from natural disasters and other unforeseen events such as spikes in energy prices due to wars such as the 2022 Russian invasion of Ukraine.

This paper provides the first comprehensive estimates of potential tax revenue gains from the implementation of an excess profits tax on subsidiaries within the European Union. Our calculations cover 8,292 MNCs with at least one subsidiary in the European Union, 1,763 of which we estimate to have excess profits. Previous estimates have been limited to small

country samples. Busby et al. (2021) estimate the cost of introducing an excess profits tax for corporations during the pandemic. However, the authors only consider Canadian corporations and forecast 2020 profits. Oxfam (2020) estimated excess profits at $80 billion using a sample of the 25 most profitable US corporations (i.e. Microsoft, Johnson & Johnson, Facebook, Pfizer, Visa, etc.) using the corporations' financial statements collected from the Securities and Exchange Commission. The systematic analysis of COVID-19 pandemic-related excess profits that we provide here became possible only when the financial statements of many large multinational corporations for the year 2020 became available in the Orbis database.

Although an excess profits tax in response to COVID-19 would be the first known use of such a tax in response to a pandemic, taxation of excess profits has a history of being used in special circumstances, most prominently during the wars of the 20th century. Indeed, excess profits tax evolved from the war profits tax that was first proposed in Denmark (8-20%) and Sweden in 1915 on the excess profits made by traders exporting goods to Germany, and was later adopted in other countries including the United States and the United Kingdom (Plehn, 1920). During the First World War, France introduced excess profits taxation (Assemblée Nationale, 2021), as did the British government with a 50 percent rate on profits above the normal pre-war level, which was then raised to 80 percent in 1917 to finance economic recovery (Dunnagan, 2020; Plehn, 1920). The United States implemented an 80% excess profits tax on earnings exceeding 8% of tangible assets to finance wartime needs in 1918 (Christians and Magalhaes, 2020). During World War II, 22 countries implemented temporary excess profits taxes (Oxfam, 2020), with tax rates of up to 100 percent (Canada) (Busby et al., 2021). Outside wartime, Germany used excess profits taxation after its unification and Japan implemented excess profits taxation in 2012 to finance reconstruction after a massive earthquake (Abdel-Kader and de Mooij, 2020).

The COVID-19 pandemic led to a decrease in tax revenue and increased the need for social and health spending (Almeida et al, 2021, Cantó et al, 2022); this combination forced governments to find new revenue sources. As one such source, tax revenue from excess profits could help governments to finance the economic recovery and cover the costs generated by the pandemic (Gaspar et al., 2021; Busby et al., 2021; Abdel-Kader and de Mooij, 2020; Christians and Magalhaes, 2020). By estimating the scale of the additional revenue for large MNCs with a presence in the European Union, we contribute new evidence to a recent stream of literature on pandemic-focused excess profits tax. Although revenue potential is naturally only one of several crucial factors in the decision-making of policymakers about the introduction and design of an excess profits tax; it has been missing from the public debate in the European Union.

The rest of this paper proceeds as follows. Section 2 discusses the conceptual framework of excess profits tax. Sections 3 and 4 present the methodology and data we use. In particular, we explain how we adjusted the average earnings approach to estimate excess profits. Section 5 presents and discusses our results. We first discuss the estimates for all MNCs with a presence in the European Union and their excess profits across all countries, by sector and by headquarter country. In section 6 we then focus on excess profits attributed to the EU member states and the extent of potential tax revenue gains. We conclude in section 7.

2 Conceptual framework

Excess profits during COVID-19 In this section, we clarify basic concepts related to excess profits and we provide arguments why excess profits during the COVID-19 pandemic represent a suitable tax base. We focus on the excess profits during the COVID-19 pandemic, which we define as profits that arose from an unexpected, extraordinary event, i.e. the COVID-19 pan-

demic. The excess profits (also known as windfall, unexpected, or extraordinary profits), during COVID-19 refer to unanticipated, fortuitous, gains generated by the COVID-19 pandemic. In general, and in line with the prevailing understanding in economics (Hebous et al., 2022), these gains could be generated by other pandemics or different types of exceptional unexpected events such as wars or natural disasters.

Related concepts The excess profits during COVID-19 are a subset of economic rent. Together with the remaining economic rent and normal profits, they comprise total profits. Correspondingly, and using some of the related concepts recently discussed by, for example, Beer et al (forthcoming) or Hebous et al. (2022), total profits consist of normal profits (or routine profits, or normal return - the sum of the safe return and risk adjustment) and economic rent (or abnormal return, supernormal profit, or residual profit or excess profit). Economic rent arises from firm-specific (market power, specialized human capital, etc.) or location-specific characteristics (access to natural or specific resources, etc.), and any unexpected (windfall) profits due to extraordinary events such as a pandemic. We summarise the relationship of the related concepts in the following two equations:

$$Total\ profits = Normal\ profits + Economic\ rent \tag{1}$$

$$Economic\ rent = COVID\text{–}19\ excess\ profits + Remaining\ economic\ rent \tag{2}$$

In other words, excess profits that arose due to the COVID-19 pandemic were a part of economic rent in 2020.

Excess profits tax Subsequently, we define excess profits tax as a one-off policy of imposing an extra tax rate - in addition to the standard corporate income tax rate - on the excess profits during the COVID-19 pandemic. Excess profits during the COVID-19 make a suitable tax base for several reasons that we discuss below.

Non-distortionary excess profits tax First and foremost, the main economic argument is that taxing excess profits should not distort the behaviour of firms - or at least less so than taxing their total profits. The COVID-19 pandemic could not be predicted and the firms' investment decisions before the pandemic were taken without expecting the opportunities for extraordinary profits that some of these firms made. The inability of firms to take into account these profits when making investment decisions is one of the reasons why taxing them should be less distortionary than increases in corporate income tax rates. An increase in corporate income tax rate affects all profit-making companies uniformly and at least some of them have a distortionary effect, whereas excess profits taxation attempts to tax only those firms with excess profits and with less distortionary effect. Indeed, during the COVID-19 many companies made lower profits than expected or losses, while other companies - as we show later in this paper - have indeed reported what amounts by our estimates to excess profits. Excess profits taxation differs between these types of firms and represents thus a more narrowly targeted measure in contrast with an alternative of a general corporate income tax rate increase. At the same time, also given the non-distortionary nature, there seems to be broader support in economics to tax supernormal profits or economic rents than total profits (Auerbach, Devereux, and Simpson, 2010),

Non-distortionary economic rent tax We show that taxing economic rent can be efficient and less distortionary than taxing the standard corporate income tax base. We provide the argument below on the basis of the exposition by Hebous et al. (2022) for economic rent, but we argue that it applies to excess profits during the COVID-19 pandemic too. Since excess profits during COVID-19 are a subset of economic rent, by extension, we argue that the excess profits tax might be as non-distortionary as an economic rent tax. We can present economic rent as:

$$Economic\_Rent = Y - wL - rK - \delta K \tag{3}$$

where: Y is the revenue of the company; w and r are the prices of labor and capital, respectively; L and K are the quantity of labor and capital, respectively, that the company uses; and δ is the depreciation rate. The solution to the maximization problem with respect to capital (marginal product of capital) is equal to

$$MP_K = r + \delta \tag{4}$$

With excess profit tax implementation, the equation becomes

$$(1 - tax)Economic\_Rent = (1 - tax)(Y - wL - rK - \delta K) \tag{5}$$

where tax is the excess profits tax rate.

The solution to the maximization problem with respect to capital remains the same. Thus, the tax is non-distorting to the cost of the capital. In comparison, the corporate income tax is distorting because it increases the cost of the capital.[1] Given the non-distortionary nature, there seems to be a broader support in economics to tax supernormal profits or economic rents than total profits (Auerbach, Devereux, and Simpson, 2011).

Temporary Second, we focus on a one-off or temporary excess profit taxation in this paper. Excess profit taxes can be levied temporarily in addition to the standard corporate income tax to increase tax revenue in response to a negative shock. Historically, these taxes were enacted mostly during wars. Most recently, the 2022 Russian invasion of Ukraine increased energy prices in Europe to which many European Union member states reacted with excess profit taxation. In this paper, we design and focus on one such recent temporary excess profit taxation as a response to the COVID-19 pandemic, for one year only, 2020. In the event that a firm does not have any excess profits during the selected period, it will not pay any extra taxes due to the implementation of excess profits tax. Moreover, the fact that excess profits taxation is in effect for a limited period of time as a one-off measure, which thus cannot itself be predicted, should further reduce its distortionary effect. Indeed, the excess profits tax is non-distorting when implemented ex-post (Collier et al., 2020). Thus, from the economic efficiency point of view, the excess profits tax should be implemented as a one-off policy and, ideally, ex-post.

Government revenue Third, excess profits taxation provides a potential extra government revenue source when the government is in need of one. When a negative shock hits, it often leads to government revenue decreases and/or government expenditures increases. This has occurred in Europe during both COVID-19 and the 2022 Russian invasion of Ukraine and,

[1] We could present the implementation of the corporate income tax (CIT) with the following equation: $(1 - CIT)Profit = (1 - CIT)(Y - wL - \delta K) - rK$. The solution to the maximization problem with respect to capital becomes $MP_K = \delta + \frac{r}{(1-CIT)}$ that increases the cost of the capital.

indeed, European governments identified in both cases excess profits taxes as a new potential government revenue source. Furthermore, the government revenue increase arising from excess profit taxation can be substantial, as we show with our estimates in this paper.

Benefit principle Fourth, excess profits can also make a useful tax base due to the benefits received principle of taxation. Firms likely to have excess profits include firms that benefit from government expenditures or, more broadly, from the government's role in the economy. These could be, for example, pharmaceutical companies during COVID-19 in 2020 or electricity generating companies in Europe in 2022. And since these companies can be viewed as inadvertently benefiting from government, they should pay more taxes than those who do not receive these benefits. In an alternative view following similar principles, Azémar et al. (2022) argue that a comparison between the gains and losses triggered by both the pandemic and the lockdown indicates that an excess profits tax imposed on the "winners" could partly compensate the "losers" of the same sector.

Excess profits tax rates These are arguments for excess profits during COVID-19 as a suitable tax base, but what rate to apply to it is more of an open question. To start with, we acknowledge that - without the excess profits tax - the excess profits in the European Union are subject to standard corporate income taxation, mostly at rates around 10-25%; only Germany had a statutory corporate income tax rate of 30% in 2021 and no EU member state had in that year a statutory corporate income tax rate higher than that. As far as we know, there is no internationally agreed excess profit tax rate (François et al., 2022; Hebous et al., 2022) and the existing literature does not provide much guidance on what the tax rates on excess profits should be. For example, the optimal tax theory is inconclusive in its implications for what the rates should be for the standard corporate income taxation (Auerbach, Devereux, and Simpson, 2010) and perhaps even less so for the excess profits taxation, which is both less studied and less applied in the real world. What is available are the real world examples. During the wars, the rate ranged from 10% to 100% and the European examples of excess profits taxes due to the 2022 energy crisis range from 25% in the United Kingdom to 60-90% in Czechia or Greece on the higher end. In these cases, naturally, the definition of the tax base is as important as the applicable tax rate and we provide an overview of these examples in the Appendix (Table A.1).

Excess profits tax rate for our estimates After considering various rates, we opt to provide estimates for proposed excess profits taxation at a 10% rate as an example. We realise that we are not able to derive optimal tax rates and that each country would determine its preferred tax rate in combination with the definition of its tax base and other economic and political factors. These factors include the perceived government revenue needs, as we can observe in the case of the European countries' excess profits taxes on energy companies. The choice of quantified an effect of a 10% rate is conservative in the sense that the rates implemented recently mostly in the European energy sectors are higher. Also, in comparison, François et al. (2022) use arbitrary tax rates equal to 33% and 50% for the revenue potential of excess profits tax using stock prices data. However, a 10% rate has the additional benefit of a simple multiplication for the revenue effects of higher excess profit tax rates.

In addition to these conceptual issues, there are practical challenges in designing an excess profits tax. In particular, we now turn to focusing on how to quantify excess profits and we address this question by proposing one feasible empirical approach in the next chapter.

3 Methodology

The average earnings approach In this section, we introduce the average earnings approach and we explain how we improve it in our paper, before comparing it with alternatives. The average earnings approach involves calculating the excess profits tax base as the total net income during the pandemic or crisis period minus the average earnings during the previous few years. The standard average earnings approach does not take into account the growth trends of companies when estimating their average earnings before the extraordinary event. This likely results in an overestimation of the excess profits and in this paper we address this shortcoming.

The trend-adjusted average earnings approach We develop a new trend-adjusted average earnings approach, which corrects for the estimated trend in growth rate and thus decreases the bias in the excess profits estimation (and hence is more conservative in the sense that it results in lower estimates of potential tax revenue gains). The main source of bias from the standard average earnings approach lies in not taking into account the fluctuations in the earnings growth from previous years. In Section 5 and in Section B.1 (in the Appendix), we discuss in detail the results from a comparison between the standard average earnings approach and the trend-adjusted average earnings approach.

The standard average earnings approach The standard average earnings approach is calculated as follows:

$$EP_i = Y_{i,2020} - Y_{i,2014-2019} \tag{6}$$

where EP_i is the excess profit for company i; $Y_{i,2020}$ is the profit of company i in 2020; $Y_{i,2014-2019}$ is the average profit of company i during the 2014-2019 period.

The trend adjustment with estimated growth rate The trend-adjusted average earnings approach with estimated growth rate is calculated as follows:

$$EP_i = Y_{i,2020} - Y_{i,2020,ctrf} \tag{7}$$

where $Y_{i,2020,ctrf}$ is a counterfactual profit of company i in 2020, calculated as:

$$Y_{i,2020,ctrf} = \frac{1}{6}\sum_{t=0}^{5}(Y_{i,2014+t} + (6-t)\beta_i) \tag{8}$$

where β_i is the estimated yearly growth for the company, which we estimate as linear,[2] and

[2]The growth rate in the literature usually is $E = C(1+g)^T$, where E is earnings/sales/costs, etc.; C is the base year constant; g is the growth rate; and T is time. With logarithmic transformation, the equation becomes $Y = \alpha + \beta X$, where Y is the logarithm of earnings/sales/costs, etc.; α is the logarithm of the base year constant; and X is time. However, with negative earnings, the logarithmic transformation could not be applied (McCrary, 1983; Damodaran, 2012). One of the approaches to handle negative earnings is to exclude them and use the regression above, but this approach introduces systematic bias into the parameters of the regression. The second approach is to add a constant to all earnings/sales/costs (equal to the positive equivalent of the minimum in all observations) and estimate the logarithmic transformation. Unfortunately, there is no straightforward way to come to the real growth rate after estimation with the constant. Thus, we use the linear regression to estimate the growth rate, including negative observations.

calculate from the regression:

$$Y_{i,t} = \alpha_i + \beta_i time_i + \epsilon_i \tag{9}$$

Revenue calculation We calculate the potential tax revenue by multiplying EP_i by a potential tax rate of a 10% tax rate as an example as discussed in the previous section. We then aggregate the potential tax revenues by headquarter country and by sector.

Host country attribution We then use additional information that enables us to attribute excess profit at the host country level. We calculate S_{nxm} as the share of activity (either number of employees or share of profits) of MNCs headquartered in the n headquarter countries in each of the m European host countries. We then take the product of the headquarter country level EP_{nx1} and S_{mxn} to obtain the excess profits (EP_{1xm}) in each host country.

Other average earnings approaches Two recent studies used the average earnings approach - without the trend adjustment - to estimate potential tax revenue from excess profits. For the 25 most profitable corporations in the United States, such as Microsoft, Johnson & Johnson, Facebook, Pfizer, and Visa, Oxfam (2020) applies the average earnings approach to the companies' financial statements from the Securities and Exchange Commission to estimate an excess profits tax revenue of up to $80 billion. For Canada, Busby et al. (2021) estimate the cost of introducing an excess profits tax on corporations' extra profits during the COVID-19 pandemic using the average earnings approach. The authors implement an additional 15 percent tax rate to the statutory corporate income tax rate on profits generated during 2020 by Canadian corporations (which earned more than $10 million in revenues in at least one year during 2016-2020) that exceed expected profits (the average profit for each firm during 2014-2019 multiplied by their 2020 total revenues). Busby et al. (2021) obtain a $7.9 billion static cost estimate for additional tax revenue from such an excess profits tax for the year 2020. The authors use forecasts for corporations' profits in 2020 using industry-level GDP growth projections because, at the time of their paper, data on real profits was not yet available. In addition, there are examples of proposals, both recent and historical, which provide an alternative view of the average earnings approach to the two studies discussed above as well as to the one developed in our paper.[3]

Invested capital approach In addition to the average earnings approach, an invested capital approach is the other main approach to calculating excess profits. The invested capital approach considers earnings above a specified return rate on capital as excessive and subject to excess profits taxation For example, the United States implemented an 80% excess profits tax on earnings above 8% of tangible assets to finance its wartime needs in 1918 according to Christians and Magalhaes (2020). On average, U.S. multinational companies earned 22% returns on assets during the 2016-2019 period (Christians and Magalhaes, 2020; Cobham et al., 2019), 8% as average return on assets, and the remainder as excess return on assets. A modified version of

[3]An alternative average earnings approach to calculating excess profits tax is considered by Avi-Yonah (2020), arguing that the base for excessive profit tax could be calculated using the average earnings method by taking total income during the pandemic minus 95 percent of the average base-period average income (i.e. over a few years before the pandemic) plus 8 percent of the corporations' net capital addition (or minus 6 percent of net capital reduction). In the Tax Foundation report (1940), the authors mention a similar approach to using average earnings with a correction on new capital acquired, but the base in this case was taken as average earnings during the previous years alone plus a fixed sum of $5 thousand.

the same approach is proposed by Avi-Yonah (2020), who argues that a fair return on invested capital is 8 percent on the first $5 million, 6 percent on the next $5 million, and 5 percent on invested capital beyond $10 million. The amount of invested capital is all the cash and property investment in the corporation, all profits prior to the taxable year plus 50 percent of current debt, reduced by amounts distributed to stockholders other than earnings and profits (Avi-Yonah, 2020). As one of the challenges of the approach, Plehn (1920) highlights that the rate of return on capital could be arbitrarily declared as the normal profit rate and the government could tax anything that exceeds that as excess or (at that time) war profits and the choice of the excess profits tax rate remains a challenge as it as historically.[4]

A brief comparison of the two approaches In our paper, we prefer the trend-adjusted average earnings approach to the invested capital approach. The trend-adjusted average earnings approach has several advantages. First, this approach is easier for governments to implement as governments only need to know the MNCs' profits/losses in the current year and a few previous years (two previous years of profit/losses statement is enough to calculate MNCs' average earnings in comparison with the current year), whereas for the invested capital approach, governments also need the MNCs' capital statements. Second, for the invested capital approach, governments would need to estimate or establish the normal rate of return to capital in order to measure excess profits. Third, in the average earnings approach there is only one measure that MNCs could manipulate (profit/losses), whereas in the invested capital approach there are two such measures (profits/losses and capital). However, a one-off excess profits tax constraints MNCs' manipulations with profits or losses. Last, but not least, the trend-adjusted average earnings approach exploits data, which is available and well known to us and to which we turn now.

4 Data

Orbis data We collect data on multinational corporations from Bureau van Dijk's Orbis database. Orbis is the best available data source for multinational corporations with a presence in the European Union and, at the same time, Orbis has the best coverage for Europe among all world regions (Garcia-Bernardo, Janský, and Tørsløv, 2021). We restrict our sample to companies with operating revenues (turnover) above $100 million and with at least one subsidiary in the European Union. We exclude companies without recent financial data, and also exclude companies classified by Orbis as "public authorities, states and governments". We use the standard NACE Rev. 2 codes for business sectors. Our data covers 8,292 MNCs with at least one subsidiary in the European Union.

Country-by-country reporting data We use country-by-country reporting data of multinational corporations from the OECD (2021) to estimate the share of profits attributable to the EU member states. We preprocess this data as in Garcia-Bernardo and Jansky (2021).

[4]For example, Great Britain set different normal rates for specific businesses in the 1920s (for risk or other peculiar reasons), i.e. the aircraft business had a 15 percent normal rate, 9 percent above the general rate (Plehn, 1920). In 1918, the United States stipulated an 8 percent normal rate of return on capital. The general rate of excess profits taxation was 30 percent for return on capital between 8 and 20 percent, and 65 percent for return on capital above 20 (Plehn, 1920). During wartime, the tax rate on excess profits was 80 percent. According to Plehn (1920), from 1920 (for 1919 profits) onwards, the excess profits tax rate dropped to 20% for return on capital below 20 percent and 40% above that threshold. The authors of the Tax Foundation report (1940) suggest a maximum excess profit credit of 10% on invested capital and a minimum credit of not less than 6% on the first $500 thousand of invested capital, plus 4% on the remainder of invested capital.

For each headquarter country (or home country, i.e. the country in which the multinational corporation has its headquarters or its parent company), we calculate the share of profits and the share of employment (Tables D.3 and D.4 in the Appendix) within each host country (i.e. the country where a subsidiary of the multinational corporation is located). Turnover is the total sales revenue that a company generates over a specific period and could reflect the real economic activity of a company. The turnover data with its sources is not available to us. Thus, we choose information on employees as a proxy for real economic activity. In comparison with turnover, employee data is less likely to be affected by profit shifting (Tørsløv et al., 2022).

5 Global excess profits and tax

Global implementation of an excess profits tax In this section and the next one, we illustrate the tax revenue potential of the excess profits tax - if it was implemented globally and in the EU member states, respectively. The current section corresponds to the estimation of the revenue potential from the implementation of the excess profits tax on a global level. This implies that governments need to cooperate with each other in such an excess profits tax design because excess profits are estimated individually for every MNC with aggregated profits worldwide. But taxing global excess profits could be challenging because it requires substantial cooperation among governments, whereas economic recovery requires immediate actions. One of the main advantages of such an approach is that even in a permanent setting, the probability of profit shifting is minimized: MNCs are less incentivised to shift profits to other countries if their global profits were subject to taxation regardless of where their profits are located. Thus, in the current literature, researchers analyze the effects of replacing the current corporate income tax with the global permanent excess profits tax design (Hebous et al., 2022; Beer et al., forthcoming).

The standard and trend-adjusted average earnings approaches To begin with, we apply both the standard and trend-adjusted average earnings approaches to the data. Table B.1 presents the comparison of summary statistics for these two approaches. The standard average earnings approach (which does not account for company growth) yields 2,526 MNCs with excess profits in comparison with 1,763 when we use the trend-adjusted average earnings approach. The standard average earnings approach does not take into account the MNCs' growth rates and therefore could overestimate or underestimate their excess profits:[5] The total excess profits made by MNCs with at least one subsidiary in the European Union are calculated as $702 billion using the standard average earnings approach, whereas with the trend-adjusted average earnings approach these estimates are $447 billion.

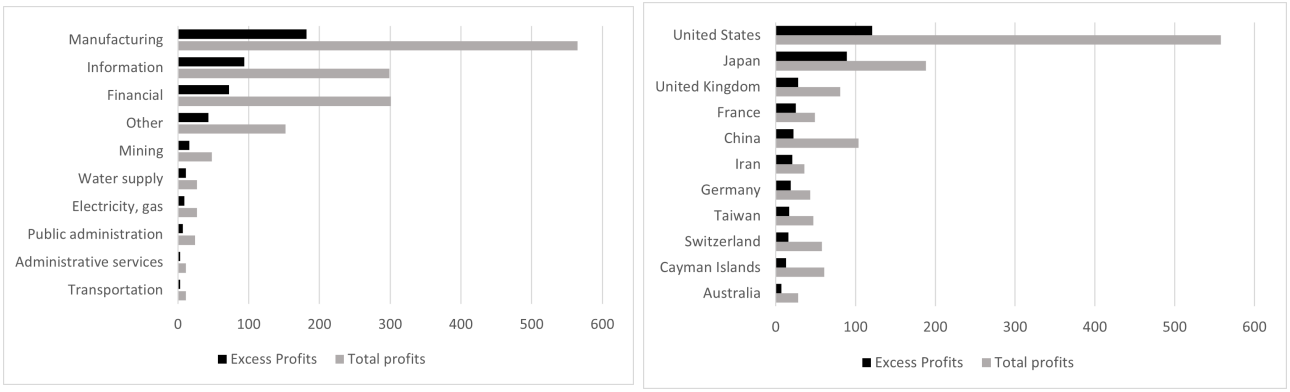
The trend-adjusted average earnings approach Applying the trend-adjusted average earnings, we estimate that multinational corporations with a presence in the European Union made excess profits of $447 billion in total in the year 2020. If an excess profits tax were to be applied to these excess profits to finance economic recovery after the pandemic, governments worldwide could raise $45 billion with a 10% excess profits tax rate as an example.These estimates are based on the total global profits of all multinational corporations with a presence in the European Union, i.e. any multinational corporation with at least one subsidiary in the European Union.

[5]In the Appendix (Section B.1) we provide an extended explanation of the differences in these approaches.

Sectors Next, we break down the MNCs' excess profits by sector (Figure 1a). Excess profits in 2020 are concentrated in manufacturing ($182 billion, 32% of the sector's total profits), the information and communication sector ($94 billion, 31% of the sector's total profits), and the financial sector ($72 billion, 24% of the sector's total profits).

Headquarter country Similarly, we investigate the location of the MNCs' headquarters for those MNCs that generated excess profits in 2020. Figure 1b shows that the United States and Japan are the countries with the largest excess profits ($121 billion and $89 billion, respectively). MNCs headquartered in all other countries made excess profits of below $30 billion: the United Kingdom ($28 billion), France ($25 billion), China ($22 billion), Iran ($21 billion), Germany ($19 billion), Taiwan ($17 billion), and Switzerland ($16 billion). Table C.1 in the Appendix presents the complete list of countries.

Figure 1: Excess profits (in black) and total profits (in grey) of MNCs with EU subsidiaries and operating revenues larger than $100 million.



(a) by industry **(b) by headquarter country**

Notes: Authors' calculations on the basis of the Orbis data. Industries correspond to NACE Rev. 2 industry codes.

The top five companies within sectors Finally, we investigate the extent to which these results are driven by individual companies (Tables 1 and 2). We find that in the information sector one company was responsible for 50% of the sector's excess profits in 2020, while the top five companies (by excess profits) were jointly responsible for 77% of the sector's excess profits (Table 1). The manufacturing and financial sectors were the least concentrated (although these are also the sectors with the largest number of firms with excess profits). In those two sectors, the top five companies were responsible for less than 25% of the sector's total excess profits (Table 1). Excess profits were also highly concentrated in the mining, electricity and gas, transportation, and human health sectors, where the top five companies were responsible for over 74% of excess profits in each sector (Table 1).

The concentration of excess profits The concentration of excess profits (measured using the Herfindahl index, which is defined as the sum of squared shares of all firms in an industry and is used in the industry concentration literature, e.g. Bajgar et al., 2019)[6] was much larger than expected (based on real 2020 profits compared to expected 2020 profits) in the information and administrative sectors (Table 1). The picture is similar when we classify companies by their headquarter country (Table 2): excess profits in 2020 were heavily concentrated in Japan,

[6]In our paper, a higher value of the Herfindahl index indicates a high concentration of excess profits, profit in 2020, or expected profit in 2020 among a few companies inside the sector (Table 1) or country (Table 2) and low level of competition between companies.

France, Iran, Cayman Islands, and Australia, while only moderately concentrated in Taiwan and Switzerland, and least concentrated in the United States, the United Kingdom, and China. These last three countries were, however, also those where most companies with excess profits were located.

Table 1: Excess profit per industry. The excess profit attributable to the company/companies with the highest excess profit is annotated as "Top 1", "Top 2", etc.

			Herfindahl index (%)			Excess profit (% total)				
Sector	Number of companies	Excess Profit (USD billion)	Excess Profit	2020 Profit	Expected 2020 Profit	Top 1	Top 2	Top 3	Top 4	Top 5
Manufacturing	832	182.0	2.0	1.3	1.4	6.4	12.6	17.6	21.5	24.9
Information	172	94.3	27.3	10.6	11.8	49.9	59.4	68.8	74.0	77.0
Financial	262	71.6	2.1	2.2	2.7	4.8	9.3	13.6	17.7	21.9
Other	149	42.9	9.6	9.6	11.2	20.4	38.0	47.4	53.5	58.1
Mining	14	15.9	16.4	20.3	30.6	22.3	43.3	63.7	74.0	74.0
Water supply	45	10.7	7.1	7.4	10.8	11.1	22.0	32.6	41.9	50.8
Electricity, gas	22	9.4	14.8	11.5	13.2	24.2	46.5	59.3	69.1	77.0
Public administration	117	6.6	5.1	9.9	15.5	12.8	22.8	31.1	38.0	42.7
Administrative services	30	2.9	21.3	15.7	15.2	42.3	55.9	61.8	67.4	72.7
Transportation	21	2.7	20.5	37.1	48.7	31.0	56.0	75.3	81.3	86.6
Human health	17	2.5	26.0	22.1	22.7	36.5	69.8	77.9	85.5	88.9

Notes: Authors' calculations on the basis of the Orbis data. The Herfindahl index is defined as the sum of squared shares of all firms in an industry. Excess profit (% total) in the table is defined as the share of firms with the largest amount of the excess profits (top 1 - top 5) of the total excess profits in an industry. Sectors correspond to NACE Rev 2 industry codes.

Table 2: Excess profit per headquarter country. The excess profit attributable to the company/companies with the highest excess profit is annotated as "Top 1", "Top 2", etc.

			Herfindahl index (%)			Excess profit (% total)				
Headquarter country	Number of companies	Excess Profit (USD billion)	Excess Profit	2020 Profit	Expected 2020 Profit	Top 1	Top 2	Top 3	Top 4	Top 5
United States	291	120.6	2.7	2.9	3.3	7.4	14.7	21.0	26.9	30.9
Japan	198	88.8	29.2	10.6	7.4	53.0	58.5	63.7	67.2	70.1
United Kingdom	121	27.9	5.0	6.2	8.4	11.7	21.6	29.8	36.7	41.9
France	45	25.2	27.1	18.6	15.0	44.9	67.4	75.9	84.0	90.4
China	163	22.0	2.7	6.7	9.0	6.3	12.0	17.2	22.2	26.5
Iran	5	21.1	26.6	26.3	27.0	42.7	58.4	73.8	89.1	100.0
Germany	63	19.4	38.8	16.1	16.2	60.0	74.5	80.6	84.1	87.5
Taiwan	79	17.1	15.6	20.8	24.8	35.7	45.9	52.2	57.8	63.3
Switzerland	28	16.1	20.2	23.7	27.1	27.5	51.7	73.9	86.4	91.0
Cayman Islands	29	13.3	48.5	39.1	40.2	66.7	86.0	90.5	91.8	92.8
Australia	14	7.3	32.2	30.4	38.1	48.4	70.8	89.2	94.1	96.2

Notes: Authors' calculations on the basis of the Orbis data. The Herfindahl index is defined as the sum of squared shares of all firms in an industry. Excess profit (% total) in the table is defined as the share of firms with the largest amount of the excess profits (Top 1-5) of the total excess profits in the country.

A robustness check using operating revenue This is an extension to our baseline trend-adjusted average earnings approach, in which we estimate a so called excess operating revenue and compare the overlap with excess profits. The trend-adjusted average earnings approach estimates excess profits regardless of whether the companies' operating revenue increased in the same way as the profits did. When the operating revenue did increase in the same way as the profits did, we consider that as an indication of a higher probability that the observed increases in profits were indeed related to increases in their primary business activities and linked to the COVID-19 pandemic. As a consequence, for a more conservative estimate than the baseline one presented in our paper, one could argue that only those increases in profits, for which we observe correspondingly large increases in operating revenue, are excess profits during COVID-19. The other increases in profits, for which we cannot observe corresponding increases in operating revenue, are other parts of economic rent, likely attributable to firm-specific or location-specific characteristics, or are, for example, one-off increases in profits due to mergers and acquisitions activity or other circumstances when profits increase but operating revenue does not. To estimate how frequent this phenomenon is, we estimate excess operating revenue using the same trend-adjusted average earnings approach, in which we plug in operating revenue instead of profits. In a robustness check, we test how large a share of the estimated excess profits overlaps with excess operating revenue. We find that there are 3,786 companies with excess operating revenue, which include a vast majority of companies with excess profits. Specifically, 1,533 companies out of 1,763 with excess profits (86%) have at the same time excess operating revenue and excess profits, which corresponds to $335 out of $447 (75%) billion of total excess profits. The overlap in terms of companies with excess profits as well as the value

of excess profits is relatively high and we therefore argue that our results are largely robust to the inclusion of operating revenue in the approach.[7]

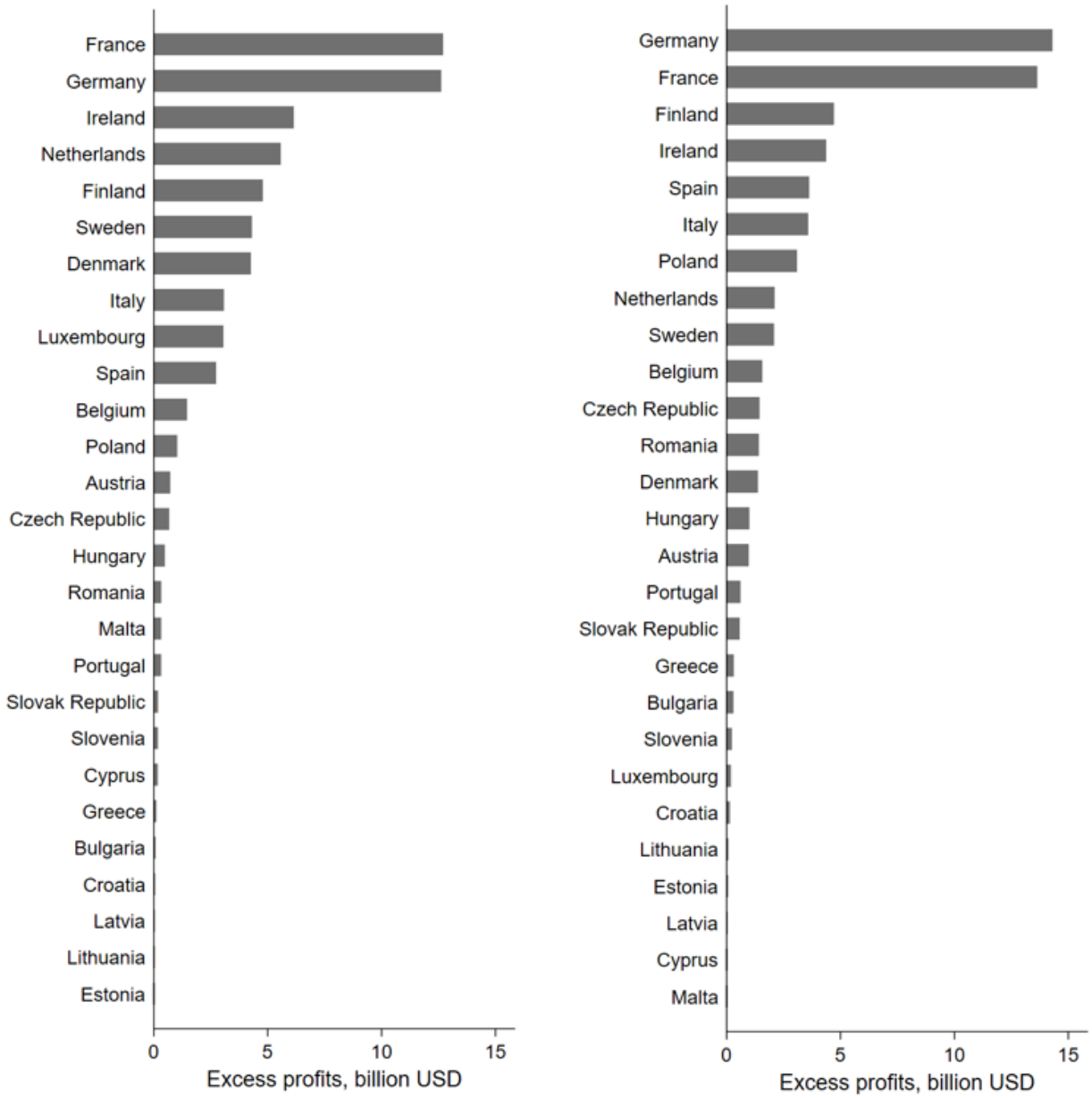
6 European Union's excess profits and tax

EU member states In this second results section, we divide excess profits among EU member states using the country-by-country reporting data. In this way, we illustrate the tax revenue potential for each EU member state. Such a design requires financial statements of MNCs from the country where the tax would be implemented, but there is no need for a broad cooperation with other governments. We choose EU countries as a case study for analyzing MNCs' excess profits generated during the COVID-19 pandemic mostly due to data availability, but also because any outstanding coordination issues might be dealt with more likely within the European Union, as the 2022 excess profits taxes for the energy sector exemplify. The same methodology could be applied to estimate an MNC's excess profits made during the COVID-19 pandemic or extraordinary events in different jurisdictions.

EU member states: excess profits Within the European Union, MNCs in France, Germany, Finland, and Ireland earned the largest excess profits. Figures 2a and 2b demonstrate the total amount of the excess profits and the distribution by host country, calculated using the share of the MNCs' profits in that country and the share of the MNCs' employees in that country, respectively. Figure 2b shows that MNCs made their largest excess profits in Germany ($14.3 billion) and France ($13.6 billion), followed by Finland ($4.7 billion), Ireland ($4.3 billion), Spain ($3.6 billion) and Italy ($3.5 billion). When excess profits are attributed according to profit which are distorted by profit shifting then the largest excess profits apparently originated in France ($12.6 billion), Germany ($12.6 billion), Ireland ($6.1 billion), the Netherlands ($5.5 billion, in comparison to $2.1 billion when profits are attributed according to employee shares) and Luxembourg ($3.1 billion in comparison to $0.1 billion when profits are attributed according to employee shares).

[7]While we focus on presenting the results using our baseline specification without the use of operating revenue, we use additional results with it in the Appendix. In the Appendix, Tables D.1 and D.2 show the concentration in sectors and countries for companies with excess profits and operating revenue at the same time. Furthermore, we estimate that governments could raise $34 billion in tax revenue with a 10% excess profits tax rate from companies with excess profit and operating revenue at the same time (in contrast with $45 billion in our baseline estimates).

Figure 2: Excess profits of MNCs' with subsidiaries in the EU with operating revenues of more than $100 million



(a) Excess profits calculated using percentage distribution of MNCs' profits among EU countries.

(b) Excess profits calculated using percentage distribution of MNCs' employees among EU countries.

Notes: Authors' calculations on the basis of the Orbis data. We present the estimates by host country; European Union member states only.

EU member states: excess profits tax revenue potential Our estimates suggest that EU governments could together raise $6 billion of tax revenue with 10% excess profits tax rate to finance economic recovery from the COVID-19 pandemic. Tables D.5-D.6 in the Appendix present the potential tax revenue from excess profits that governments could collect, using various excess profits tax rates for illustration. When excess profits are distributed according to the reported location of profits (Table D.5), the total tax revenue from excess profits for all EU member states together would be $6.5 billion with a 10% tax rate. When excess profits are distributed according to the location of the MNCs' employees (Figure D.6), the total excess

profits tax revenue for all EU member states together would be $6.2 billion with a 10% tax rate.

7 Conclusion

Starting in early 2020, the COVID-19 pandemic substantially affected countries' tax revenues. We argue that the implementation of a tax on excess profits could finance the economic recovery and cover some of the costs of the pandemic. Using a newly developed trend-adjusted average earnings approach, we estimate the excess profits made during the pandemic by the largest MNCs with a presence in the European Union. We also provide estimates of the tax revenue potential these excess profits represent were governments to impose an excess profits tax.

We find that large MNCs with a presence in the European Union made excess profits totalling $447 billion worldwide in 2020, and that the largest shares of these excess profits were made by MNCs headquartered in the United States ($120 billion) and Japan ($88 billion). We further estimate that MNCs' subsidiaries in the European Union generated $60 billion of those excess profits, of which the largest shares were in Germany and France (both $13 billion).

Our findings suggest that governments in the European Union could collect $6 in excess profits tax revenue with a 10% excess profits tax rate. For the EU as a whole, regardless of whether an excess profits tax was to be implemented as an EU-wide tax or a new revenue source for individual member states, such a tax is comparable to other recently introduced or discussed new taxes. How corporations would behave in response to such additional taxation (e.g. whether profit shifting to tax havens would increase) is beyond the scope of this paper. If EU policymakers were to introduce such a tax, they could consider obtaining relatively modest revenues for each individual member state or agreeing on it as a new EU tax-based revenue source with which to finance the recovery or the EU budget. While taxation of excess profits could be implemented as a one-off policy to finance economic recovery from the pandemic, it could also be implemented after natural disasters or unexpected events retrospectively (François et al., 2022). Among others, Neidle (2022) argues for tax global excess profits instead of local ones to reduce tax avoidance consequences. However, taxing global excess profits could be challenging.

The revenue potential we estimate in this paper is a crucial factor in the decision-making of policymakers regarding the introduction and design of an excess profits tax. Besides the potential revenues, further important considerations include the costs and benefits of such taxation. Although their evaluation is beyond the scope of this paper, we discuss them here very briefly on the basis of the existing literature. On the one hand, there are several advantages to an excess profits tax. Excess profits tax is designed to capture additional profits that were generated, due to external events, at a time when other businesses could not operate during the crisis (Collier et al., 2020; Christians and Magalhaes, 2020). Additionally, excess profits tax or windfall tax is non-distortionary and economically efficient in a one-off ex-post form (Collier et al., 2020). Furthermore, Christians and Magalhaes (2020) argue that excess profits taxes have better prospects of covering public spending due to the pandemic than consumption-based taxes. Moreover, Oxfam (2020) has proposed that a COVID-19 pandemic profits tax could help with several issues simultaneously: it would hold an incentive for a price increase on necessary goods and services after the crisis, redistribute the oversized profits, decrease the financial and market power of companies with excessive profits from the pandemic, and raise revenue to pay for key equalizing public services or fund healthcare workers during the pandemic.

Despite the above advantages, arguments have also been raised against the introduction of an excess profits tax, one of which is that such a tax is, like any other tax, susceptible to tax avoid-

ance. Indeed, an excess profits tax could encourage MNCs to implement tax avoidance schemes (e.g. acquiring loss-making companies or shifting profits to tax havens). As a consequence, Avi-Yonah (2020) recommends adopting mandatory consolidation at the above 50% level, including foreign subsidiaries and restricting corporations from acquiring corporations with losses to offset profits. Such tax avoidance is, however, less likely during the pandemic: Collier et al. (2020), for example, argue that political and public tolerance for profit shifting decreased during the pandemic since any company that fails to pay its fair share of tax is deemed to be particularly reprehensible at a time of national crisis. Last, but not least, corporations' owners could shift any increase in their tax burden onto workers or consumers; the incidence of this resulting from an excess profits tax is as unclear as that of other corporate taxes studied in the academic literature (Clausing, 2013; Suárez Serrato and Zidar, 2016; Fuest et al., 2018). These issues could be addressed through design features of the excess profits tax or complementary regulatory measures.

Compliance with ethical standards

Funding

This study was funded by the Czech Science Foundation (CORPTAX, 21-05547M) and Grant Agency of Charles University (GAUK, 130122), and was supported by the Cooperatio Program at Charles University (research area Economics) and the European Parliament's Left Group.

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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Appendices

A Excess profits tax rates

Table A.1: Examples of excess profit taxes due to 2022 energy crisis (temporary windfall taxes)

State	Rate	Description of the tax
Austria	40%	On oil and gas companies that have profits 20% higher than for previous four years. But companies could reduce the tax rate to 33% if they invest in renewable energy.
Bulgaria	33%	On energy companies that have profits 20% higher than for the last four years.
Czech Republic	60%	On energy companies and banks that have profits 20% higher than the 2018-2021 average. The tax is levied on top of the 19% corporate income tax rate. Banks should have at lest 6 billion CZK (€250 million) of gross interest income; companies should have at least 50 million CZK (€2 million) income in at least one year from the 2023-2025 period that represents at least 25% of the total turnover.
Germany	33%	On oil, coal, and gas companies that have profits 20% higher than the 2018-2021 average.
Greece	90%	On power producers' excess profits on a retroactive basis. The tax base is calculated as a difference between the current month's profit and profit for the same month in the previous year.
Hungary	depend on the sector	On companies from petroleum products production, renewable energy, pharmaceutical.
Ireland	75%	On fossil fuel producers that have profits 20% higher than the 2018-2021 average.
Italy	25%	On companies from oil and gas sectors. The tax base is the difference between VAT sales and purchases between October 2021 and April 2022 and the same months of the previous year.
Netherlands	33%	On companies in hydrocarbon extraction, mining, petroleum refining, and manufacturing of coke oven products sectors that have profits 20% higher than the 2018-2021 average. The tax is introduced on a retroactive basis.
Romania	80%	On companies from energy production sector, energy suppliers and traders. The tax base is the excess of the average selling price of electricity in a month (higher than RON 450 or €91 per MWh).
Slovakia	70%	On companies from oil and natural gas sectors with excessive profits.
United Kingdom	25%	On oil and gas companies. The tax is implemented on the profits that are already subject to the 20% headline tax.

Notes: In this table we use several sources of information: 1. Reuters. Factbox: Windfall tax mechanisms on energy companies across Europe (`https://www.reuters.com/business/energy/windfall-tax-mechanisms-energy-companies-across-europe-2022-12-08/`); 2. PWC. Energy emergency measures: solidarity charge and revenue cap (`https://www.pwc.nl/en/insights-and-publications/tax-news/other/energy-emergency-measures--solidarity-charge-and-revenue-cap.html`); 3. Tax Foundation. What European Countries Are Doing about Windfall Profit Taxes (`https://taxfoundation.org/windfall-tax-europe/`).

B Comparison of approaches

Table B.1: Comparison of standard average earnings approach estimates and trend-adjusted average earnings approach estimates.

Statistic	Standard average earnings approach	Trend-adjusted average earnings approach
Number of companies with excess profits	2,526	1,763
Total excess profits, billion USD	702	447
Total excess profits, billion EUR	572	364
Mean of the excess profits among MNCs, billion USD	0.27	0.25
Mean of the excess profits among MNCs, billion EUR	0.22	0.203
The highest excess profit among MNCs, billion USD	42	47
The highest excess profit among MNCs, billion EUR	34	38
The lowest excess profit among MNCs, million USD	0.01071	0.00288
The lowest excess profit among MNCs, million EUR	0.00873	0.00235

B.1 Differences in the standard average earnings and trend-adjusted average earnings approaches

Excess Profits with the standard average earnings approach:

$$EP_{i,SA} = Y_{i,2020} - \overline{Y_i} > 0 \tag{10}$$

Where: $Y_{i,2020}$ is the profit in 2020 and $\overline{Y_i}$ is the average profit for the 2014-2019 period of a company i.

Excess Profits with the trend-adjusted average earnings approach:

$$EP_{i,TA} = Y_{i,2020} - \overline{Y_{i,TA}} > 0 \tag{11}$$

Where $\overline{Y_{i,TA}}$ is the average profit calculated with the trend-adjusted average earnings approach (or counterfactual profit) of a company i in the following way:

$$\begin{aligned}\overline{Y_{i,TA}} = \frac{1}{6}\sum_{t=0}^{5}(Y_{i,2014+t} + (6-t)\hat{\beta}_i) = \frac{Y_{i,2014} + 6\hat{\beta}_i + Y_{i,2015} + 5\hat{\beta}_i + Y_{i,2016} + 4\hat{\beta}_i}{6} + \\ + \frac{Y_{i,2017} + 3\hat{\beta}_i + Y_{i,2018} + 2\hat{\beta}_i + Y_{i,2019} + \hat{\beta}_i}{6} = \overline{Y_i} + \frac{21\hat{\beta}_i}{6}\end{aligned} \tag{12}$$

$$\begin{aligned}\hat{\beta}_i = \frac{\sum_{j=1,t=2014}^{6,2019}(time_{ij} - \overline{time_i})(Y_{it} - \overline{Y_i})}{\sum_{j=1}^{6}(time_{ij} - \overline{time_i})^2} = \frac{2.5(Y_{i,2019} - Y_{i,2014})}{17.5} + \\ + \frac{1.5(Y_{i,2018} - Y_{i,2015}) + 0.5(Y_{i,2017} - Y_{i,2016})}{17.5}\end{aligned} \tag{13}$$

Where $time_i \in [1, 6]$, corresponding to years from 2014 to 2019 for year company. Taking together equations 11, 12, and 13, we obtain:

$$EP_{i,TA} = Y_{i,2020} - \overline{Y_i} - \frac{21(2.5(Y_{i,2019} - Y_{i,2014}) + 1.5(Y_{i,2018} - Y_{i,2015}) + 0.5(Y_{i,2017} - Y_{i,2016}))}{6 * 17.5} \tag{14}$$

The main difference in standard average earnings approach (equation 10) and trend-adjusted average earnings approach (equation 14) lies in the last term of equation 14 that could be negative or positive as the growth rate takes into account profits and losses of the company.

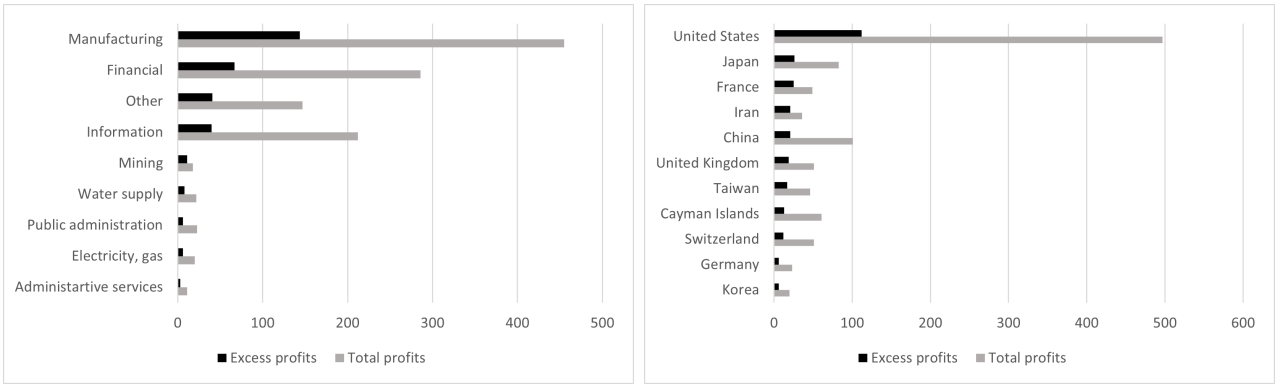
C Tables for companies only with excess profits

Table C.1: Excess profits by headquarter country earned by MNCs with European Union subsidiaries and operating revenue (turnover) of more than $100 million.

#	Headquarter Country	Excess profits, billion USD	#	Headquarter Country	Excess profits, billion USD
1	United States	120.566	35	Austria	0.350
2	Japan	88.762	36	Chile	0.300
3	United Kingdom	27.919	37	Poland	0.299
4	France	25.234	38	Saudi Arabia	0.296
5	China	22.042	39	Greece	0.290
6	Iran	21.142	40	Hungary	0.288
7	Germany	19.419	41	Russia	0.242
8	Taiwan	17.083	42	Lithuania	0.166
9	Switzerland	16.053	43	Slovenia	0.163
10	Cayman Islands	13.336	44	New Zealand	0.143
11	Australia	7.312	45	Malta	0.141
12	Korea	6.443	46	Iceland	0.115
13	Denmark	6.073	47	Kazakhstan	0.107
14	Canada	5.464	48	Mexico	0.103
15	Sweden	5.460	49	Egypt	0.068
16	Finland	4.364	50	Gabon	0.060
17	Other	4.135	51	Marshall Islands	0.053
18	Netherlands	4.048	52	Colombia	0.050
19	India	3.970	53	Sri Lanka	0.030
20	Ireland	3.691	54	Andorra	0.028
21	Bermuda	2.943	55	Romania	0.026
22	Luxembourg	2.688	56	Latvia	0.024
23	Italy	2.554	57	Philippines	0.023
24	Spain	2.129	58	Croatia	0.020
25	Singapore	1.708	59	Cyprus	0.017
26	Brazil	1.650	60	Qatar	0.017
27	Norway	1.411	61	Vietnam	0.015
28	Hong Kon	1.392	62	Pakistan	0.014
29	Thailand	1.144	63	Serbia	0.008
30	Belgium	1.105	64	Bangladesh	0.006
31	Malaysia	0.973	65	Indonesia	0.005
32	Portugal	0.748	66	Macedonia	0.005
33	Israel	0.561	67	British Virgin Islands	0.001
33	Turkey	0.417			

D Tables and figures for companies simultaneously with excess profits and excess operating revenue

Figure D.1: Excess profits (in black) and total profits (in grey) of MNCs with European Union subsidiaries and operating revenues (turnover) larger than $100 million.



(a) by industry **(b) by headquarter country**

Notes: Authors' calculations on the basis of the Orbis data. We use NACE Rev. 2 industry codes. The excess profits tax revenue is only for companies with excess profits and excess operating revenue.

Table D.1: Excess profit per industry. The excess profit attributable to the company/companies with the highest excess profit is annotated as "Top 1", "Top 2", etc.

			Herfindahl index (%)			Excess profit (% total)				
Sector	Number of companies	Excess Profit (USD billion)	Excess Profit	2020 Profit	Expected 2020 Profit	Top 1	Top 2	Top 3	Top 4	Top 5
Manufacturing	712	143.6	2.2	1.5	1.5	7.9	14.2	19.1	23.4	27.3
Financial	236	67.4	2.4	2.4	2.9	5.1	9.9	14.4	18.8	23.2
Other	130	40.8	10.5	10.2	11.8	21.5	40.0	49.9	56.2	61.1
Information	152	39.9	12.6	13.9	14.9	22.4	44.7	57.0	64.1	69.2
Mining	8	10.9	29.1	28.8	30.9	32.6	63.1	92.9	98.3	99.2
Water supply	36	8.0	8.9	10.0	13.6	15.0	29.3	41.3	51.9	58.8
Public administration	108	6.5	5.3	10.3	16.2	13.0	23.3	31.8	38.7	43.5
Electricity, gas	18	6.3	19.0	15.5	17.8	33.5	52.8	67.7	77.2	83.6
Administrative services	28	2.9	21.9	15.9	15.3	42.9	56.7	62.6	68.3	73.7
Human health	16	2.4	27.7	28.2	28.7	37.8	72.2	80.6	88.5	91.6
Construction	28	1.9	21.7	12.0	12.6	42.0	52.8	62.3	71.7	80.5

Notes: Authors' calculations on the basis of the Orbis data. The excess profits tax revenue only for companies with excess profits and excess operating revenue. The concentration of excess profits is measured by Herfindahl index, which is defined as the sum of squared shares of all firms in an industry. A higher value of the Herfindahl index indicates a high concentration of excess profits, profit in 2020, or expected profit in 2020 among a few companies inside the country/industry and low competition between companies. Excess profit (% total) in the table is defined as the the share of firms with the largest amount of the excess profits (top 1 - top 5) of the total excess profits in an industry. Sectors correspond to NACE Rev 2 industry codes.

Table D.2: Excess profit per headquarter country. The excess profit attributable to the company/companies with the highest excess profit is annotated as "Top 1", "Top 2", etc.

			Herfindahl index (%)			Excess profit (% total)				
Headquarter country	Number of companies	Excess Profit (USD billion)	Excess Profit	2020 Profit	Expected 2020 Profit	Top 1	Top 2	Top 3	Top 4	Top 5
United States	255	111.6	3.1	3.4	3.8	8.0	15.9	22.6	29.0	33.4
Japan	147	25.7	5.4	5.0	6.8	12.0	22.0	31.6	39.7	46.2
France	43	25.2	27.1	18.6	15.1	44.9	67.4	75.9	84.0	90.4
Iran	5	21.1	26.6	26.3	27.0	42.7	58.4	73.8	89.1	100.0
China	155	21.0	2.9	7.1	9.3	6.6	12.6	18.0	23.3	27.7
United Kingdom	100	19.4	6.2	6.5	7.4	16.8	26.8	34.2	40.1	44.8
Taiwan	69	16.8	16.1	21.8	26.2	36.3	46.6	53.0	58.7	64.3
Cayman Islands	29	13.3	48.5	39.1	40.2	66.7	86.0	90.5	91.8	92.8
Switzerland	26	12.3	25.7	28.6	30.5	35.7	67.1	83.3	89.4	91.2
Germany	55	6.4	24.2	21.4	20.9	44.0	62.6	71.1	75.0	78.8
Korea	52	6.2	7.7	5.8	6.4	15.3	29.4	40.1	49.8	54.4

Notes: Authors' calculations on the basis of the Orbis data. The excess profits tax revenue is only for companies with excess profits and excess operating revenue. The concentration of excess profits is measured by the Herfindahl index, which is defined as the sum of squared shares of all firms in an industry. A higher value of the Herfindahl index indicates a high concentration of excess profits, profit in 2020, or expected profit in 2020 among a few companies inside the country/industry and low competition between companies. Excess profit (% total) in the table is defined as the the share of firms with the largest amount of the excess profits (top 1 - top 5) of the total excess profits in the country.

Table D.3: Percentage distribution of profits among EU host-countries by MNCs' headquarter countries.

EU member states / headquarter countries	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden
Australia	0.01	0.08	≈ 0			0.01	0.06			0.27	1.32	≈ 0	≈ 0	0.18	0.05			0.10	0.01	0.06	0.02	0.01	≈ 0	≈ 0		0.05	0.03
Austria	65.26																										
Belgium		7.47								0.33	0.46							4.34		1.17	0.05		0.01			0.55	
Brazil	2.92	0.02								0.03	0.32							02.07		1.37		0.15					
Canada										0.26										0.45							
China	≈ 0	0.03	≈ 0	≈ 0	0.02	0.01	≈ 0		≈ 0	0.07	0.29	0.01	0.07	0.08	0.02			0.06	≈ 0	0.09	0.01		≈ 0	≈ 0		0.01	0.05
Denmark	0.22	0.21	0.03	0.03		0.13	67.11	0.06	1.34	0.84	1.52	0.04	0.27	0.61	0.45		0.03	0.16		02.05	0.45	0.02	0.07	0.06	0.03	0.22	2.54
Finland									100																		
France	0.16	02.02	0.07	0.02		0.68	0.13		0.09	45.79	2.89	0.09	0.34	0.72	2.51	0.01		2.18	0.13		0.82	0.64	0.58	0.18		2.85	0.37
Germany	1.18	0.97	0.10	0.09		1.53	0.18	0.01	0.48	1.34	50.90	0.13	0.65	0.71	1.25	0.01	0.02	2.35	1.41	2.50	0.64	0.27	0.36	0.41	0.05	1.24	0.72
Greece												4.83															
India	0.01	0.32		≈ 0		0.05			0.01	0.06	0.71	≈ 0	≈ 0	0.01	0.08	≈ 0	≈ 0	0.01	≈ 0		0.05	≈ 0	0.04	≈ 0		0.11	0.08
Indonesia	≈ 0									0.01					≈ 0				≈ 0							≈ 0	
Ireland														100													
Italy	0.63	0.19	0.22	0.36	0.10	0.73	0.12	≈ 0	0.09	2.27	4.55	0.06	0.21	0.94	58.86	≈ 0	≈ 0	2.61	0.01	1.18	0.36		0.20	0.33	0.02	8.85	0.10
Japan	0.06	0.19	≈ 0	≈ 0	0.16	0.06	0.04	≈ 0	0.02	0.16	0.68	≈ 0	0.04	0.30	0.18	≈ 0	≈ 0	0.01	≈ 0	0.98	0.07	0.01	0.04	≈ 0	≈ 0	0.22	0.09
Latvia					0.01	0.18		0.09								74.48	0.17						0.05	02.08	0.13		0.19
Luxembourg		3.67	0.01	0.06	0.65	0.27	0.28	≈ 0	02.08	3.93	07.05	0.07	0.25			0.14	0.01			10.25	1.50	0.25	0.05	0.07	0.04	03.03	21.80
Malaysia																		0.35									
Mexico	4.25	0.05		0.03		0.07	0.08		≈ 0	0.13	0.33		0.10			≈ 0	≈ 0		≈ 0		0.03	0.01	0.01	0.08	0.22	1.53	0.02
Netherlands																				29.92							
Poland			0.03																		91.78						
Singapore											0.04									0.47							
Slovenia				2.73																					86.59		
Spain	0.11	0.15		0.01	0.02	0.02	0.11	≈ 0	0.07	1.77	1.50	0.07	0.03	0.87	0.67	≈ 0	≈ 0		0.23	1.23	1.13	1.52	0.10		0.01	43.04	
Sweden																											56.43
Switzerland	0.41	0.10	0.07	0.02		0.21	0.04	≈ 0	0.66	0.92	2.24	0.05		0.06	0.37	≈ 0	0.01	2.39	0.04	0.48	0.38	0.08	0.15	0.05	0.11	0.61	0.52
United States	0.01	0.29	0.01	0.01		0.06	0.05	≈ 0	0.03	0.24	0.34	0.02	0.16	1.45	0.35	≈ 0	0.01	1.23		1.97	0.15	0.03	0.02	0.03	≈ 0	0.19	0.05

Table D.4: Percentage distribution of employees among EU host-countries by MNCs' headquarter countries.

country	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden
Australia	0.02	0.10	0.01		≈ 0	0.02	0.02		0.02	1.52	0.75	0.01	0.01	0.11	0.07			≈ 0	≈ 0	0.06	0.11	0.06	≈ 0	≈ 0		0.13	0.06
Austria	32.67																										
Belgium		24.24								9.34	5.23							0.43		2.32	0.94		0.39			0.74	
Brazil	0.03	≈ 0								0.08	0.17				0.06			0.01		0.04		0.17				0.11	
Canada										0.70										0.36						0.23	
China	0.01	0.04	≈ 0	≈ 0	≈ 0	0.02	0.01		≈ 0	0.09	0.23	0.01	0.02	≈ 0	0.06			≈ 0	≈ 0	0.03	0.02	≈ 0	0.01	≈ 0		0.03	0.14
Denmark	0.73	0.88	0.09	0.11	0.01	0.78	17.43	0.23	1.37	2.94	4.45	0.22	1.14	0.36	0.66	0.08	0.37	0.04		1.35	03.08	0.64	0.31	0.51	0.15	2.85	2.37
Finland									100																		
France	0.24	1.42	0.09	0.04		0.65	0.13		0.10	40.03	3.76	0.08	0.38	0.18	2.41	0.02		0.19	≈ 0	1.17	2.31	0.68	1.26	0.22		3.51	0.49
Germany	1.89	0.64	0.33	0.28	0.01	2.35	0.33	0.05	0.21	2.30	45.11	0.27	1.55	0.22	1.51	0.04	0.07	0.14	0.02	01.02	2.37	0.45	1.68	1.12	0.16	2.11	0.66
Greece												40.95															
India	0.01	0.07	≈ 0	≈ 0	≈ 0	0.08	0.02	≈ 0	0.03	0.15	0.44	≈ 0	0.13	0.07	0.06	≈ 0	0.04	≈ 0	≈ 0	0.33	0.19	0.02	0.05	0.02		0.13	0.09
Indonesia	≈ 0									0.10					≈ 0				≈ 0	≈ 0						≈ 0	
Ireland														100													
Italy	0.82	0.30	0.44	0.78	0.03	0.71	0.12	0.02	0.15	2.52	3.50	0.23	0.58	0.10	51.11	0.01	0.02	0.06	0.02	0.68	1.23	0.32	1.77	0.55	0.18	02.06	0.21
Japan	0.07	0.27	0.06	≈ 0	≈ 0	0.26	0.04	≈ 0	0.05	0.58	0.92	0.01	0.19	0.04	0.30	≈ 0	0.01	0.01	≈ 0	0.27	0.33	0.06	0.31	0.06	0.01	0.32	0.08
Latvia					0.07	0.60		0.37								57.28	0.40						0.90	1.99	0.21		0.48
Luxembourg	0.38	02.09	0.15	0.08	0.01	0.68	0.22	0.02	0.18	9.71	6.73	0.04	0.26	0.11	4.19	0.08	0.03	1.26		0.97	2.51	0.60	1.43	0.11	0.03	3.43	0.58
Malaysia																		≈ 0		0.01							
Mexico	0.41	0.03	0.18	0.11	≈ 0	0.19	0.06	≈ 0	≈ 0	0.25	0.39		0.16	≈ 0	0.05	0.02	≈ 0	≈ 0	≈ 0		0.77	0.05	0.08	0.04	0.03	04.05	0.01
Netherlands																				13.62							
Poland			0.12																		85.98						
Singapore											0.29									0.21							
Slovenia				05.01																					61.66		
Spain	0.14	0.16	0.05	0.06	≈ 0	0.35	0.04	≈ 0	0.03	1.52	1.81	0.16	0.06	0.11	0.81	≈ 0	0.01	0.02	0.01	0.25	1.30	2.22	0.24	0.08	0.01	42.36	0.07
Sweden																											22.59
Switzerland	1.20	0.54	0.44	0.12		01.05	0.35	0.09	0.43	3.27	7.38	0.24	0.45	0.25	2.00			0.10		0.59	2.40	0.29	0.70	0.27	0.36	1.30	0.85
United States	0.08	0.29	0.05	0.01	≈ 0	0.27	0.09	0.01	0.06	01.02	1.52	0.04	0.21	0.40	0.49	0.01	0.02	0.03	≈ 0	0.43	0.64	0.11	0.22	0.13	0.01	0.47	0.15

Table D.5: Excess profits tax revenue originating from MNCs' subsidiaries in EU countries calculated using percentage distribution of profits among EU countries.

Host Country	Excess profits tax revenue, billions USD							
	Excess profits, billions USD	10% tax rate	20% tax rate	30% tax rate	40% tax rate	50% tax rate	60% tax rate	70% tax rate
Romania	0.32	0.03	0.06	0.10	0.13	0.16	0.19	0.23
Germany	12.61	1.26	2.52	3.78	5.04	6.31	7.57	8.83
Malta	0.32	0.03	0.06	0.10	0.13	0.16	0.19	0.22
Italy	3.07	0.31	0.61	0.92	1.23	1.54	1.84	2.15
Ireland	6.15	0.61	1.23	1.84	2.46	3.07	3.69	4.30
Austria	0.72	0.07	0.14	0.22	0.29	0.36	0.43	0.50
Denmark	4.26	0.43	0.85	1.28	1.71	2.13	2.56	2.99
France	12.70	1.27	2.54	3.81	5.08	6.35	7.62	8.89
Greece	0.11	0.01	0.02	0.03	0.04	0.05	0.07	0.08
Slovak Republic	0.19	0.02	0.04	0.06	0.07	0.09	0.11	0.13
Luxembourg	3.06	0.31	0.61	0.92	1.22	1.53	1.83	2.14
Spain	2.73	0.27	0.55	0.82	1.09	1.37	1.64	1.91
Portugal	0.32	0.03	0.06	0.09	0.13	0.16	0.19	0.22
Hungary	0.48	0.05	0.10	0.14	0.19	0.24	0.29	0.34
Poland	1.02	0.10	0.20	0.31	0.41	0.51	0.61	0.71
Sweden	4.30	0.43	0.86	1.29	1.72	2.15	2.58	3.01
Netherlands	5.57	0.56	1.11	1.67	2.23	2.79	3.34	3.90
Belgium	1.46	0.15	0.29	0.44	0.58	0.73	0.88	1.02
Bulgaria	0.07	0.01	0.01	0.02	0.03	0.04	0.04	0.05
Czech Republic	0.67	0.07	0.13	0.20	0.27	0.33	0.40	0.47
Croatia	0.05	0.01	0.01	0.02	0.02	0.03	0.03	0.04
Finland	4.78	0.48	0.96	1.43	1.91	2.39	2.87	3.34
Cyprus	0.17	0.02	0.03	0.05	0.07	0.08	0.10	0.12
Estonia	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Slovenia	0.18	0.02	0.04	0.05	0.07	0.09	0.11	0.13
Lithuania	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Latvia	0.03	0.00	0.01	0.01	0.01	0.01	0.02	0.02
Total	65.37	6.54	13.07	19.61	26.15	32.69	39.22	45.76

Table D.6: Excess profits tax revenue originating from MNCs' subsidiaries in EU countries calculated using percentage distribution of employees among EU countries.

Host Country	Excess profits tax revenue, billions USD							
	Excess profits, billions USD	10% tax rate	20% tax rate	30% tax rate	40% tax rate	50% tax rate	60% tax rate	70% tax rate
Romania	1.41	0.14	0.28	0.42	0.56	0.71	0.85	0.99
Germany	14.31	1.43	2.86	4.29	5.72	7.15	8.58	10.01
Malta	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Italy	3.58	0.36	0.72	1.07	1.43	1.79	2.15	2.50
Ireland	4.37	0.44	0.87	1.31	1.75	2.19	2.62	3.06
Austria	0.97	0.10	0.19	0.29	0.39	0.48	0.58	0.68
Denmark	1.37	0.14	0.27	0.41	0.55	0.68	0.82	0.96
France	13.63	1.36	2.73	4.09	5.45	6.82	8.18	9.54
Greece	0.31	0.03	0.06	0.09	0.12	0.15	0.19	0.22
Slovak Republic	0.58	0.06	0.12	0.17	0.23	0.29	0.35	0.40
Luxembourg	0.19	0.02	0.04	0.06	0.08	0.10	0.11	0.13
Spain	3.62	0.36	0.72	1.09	1.45	1.81	2.17	2.54
Portugal	0.60	0.06	0.12	0.18	0.24	0.30	0.36	0.42
Hungary	0.99	0.10	0.20	0.30	0.40	0.50	0.59	0.69
Poland	3.09	0.31	0.62	0.93	1.24	1.55	1.86	2.17
Sweden	2.08	0.21	0.42	0.62	0.83	1.04	1.25	1.45
Netherlands	2.11	0.21	0.42	0.63	0.84	1.05	1.26	1.47
Belgium	1.56	0.16	0.31	0.47	0.62	0.78	0.94	1.09
Bulgaria	0.30	0.03	0.06	0.09	0.12	0.15	0.18	0.21
Czech Republic	1.44	0.14	0.29	0.43	0.58	0.72	0.86	1.01
Croatia	0.14	0.01	0.03	0.04	0.06	0.07	0.08	0.10
Finland	4.71	0.47	0.94	1.41	1.88	2.35	2.82	3.29
Cyprus	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Estonia	0.06	0.01	0.01	0.02	0.02	0.03	0.04	0.04
Slovenia	0.23	0.02	0.05	0.07	0.09	0.11	0.14	0.16
Lithuania	0.08	0.01	0.02	0.02	0.03	0.04	0.05	0.05
Latvia	0.04	0.00	0.01	0.01	0.02	0.02	0.03	0.03
Total	61.77	6.18	12.35	18.53	24.71	30.89	37.06	43.24