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CORPORATE PROFIT MISALIGNMENT: EVIDENCE FROM GERMAN HEADQUARTER COMPANIES AND THEIR FOREIGN AFFILIATES

Sarah Godar
Petr Janský

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$$\frac{1}{(m-1)!} p^{m-1} (1-p)^{n-m} = p \sum_{\ell=0}^{n-1} \frac{\ell+1}{n} \frac{(n-1)!}{(n-1-\ell)! \ell!} p^{\ell} (1-p)^{n-1-\ell} = p \frac{n-1}{n} \sum_{\ell=0}^{n-1} \left[\frac{\ell}{n-1} + \frac{1}{n-1} \right] \frac{(n-1)!}{(n-1-\ell)! \ell!} p^{\ell} (1-p)^{n-1-\ell} = p^2 \frac{n-1}{n} +$$

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Corporate Profit Misalignment: Evidence from German Headquarter Companies and Their Foreign Affiliates

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Abstract:

Despite numerous data challenges, economists have established that the multinational corporations' reported profits are not well aligned with their economic activity across countries. However, uncertainties remain about the extent and patterns of this misalignment. We fill in this gap for German-based multinational corporations and their foreign affiliates. We use the data collected by the Deutsche Bundesbank, which include confidential data on foreign direct investments and a combination of confidential and publicly available balance sheet data. We find that the world's tax havens attract a considerably higher share of German multinational corporations' profit than economic activity, while in Eastern European countries, most developing countries and some big European countries reported profits are much lower than economic activity would suggest. We also find that the most important tax haven is the Netherlands, followed by other EU tax havens of Cyprus, Ireland, Luxembourg and Malta.

JEL: F21; F23; H25

Keywords: multinational corporations; profit misalignment; tax havens; Germany

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Data availability statement: The data that support the findings of this study are available from the Deutsche Bundesbank. Restrictions apply to the availability of these data, which were used under license for this study.

1. Introduction

Under its recent Base Erosion and Profit Shifting proposals, the Organisation for Economic Co-operation and Development requires all large multinational corporations to report aggregate data on the global allocation of income, profit, taxes paid and economic activity among tax jurisdictions in which it operates (Country-by-Country Reporting). This measure was motivated by the lack of quality data on the activities of multinational corporations which has troubled tax authorities worldwide. But not only tax authorities, also researchers have been troubled by the lack of representative data on the activities of multinational corporations. Good data is available for U.S.-based multinational corporations because the Bureau of Economic Analysis collects and publishes data on parent (or headquarter) firms and affiliates. Research on European multinational corporations mostly relies on data by private data providers such as the Bureau van Dijk's Amadeus and Orbis databases. Orbis, despite being the most comprehensive data source, covers only a non-representative share of the global profits of multinational groups (Tørsløv et al. 2018). The publication of the foreign affiliate statistics has improved the public data availability for Europe significantly but they do not include information on the profits and activities of domestic parent companies. Domestic parent companies are, however, estimated to account for about 21 percent of global output or 60 percent of global multinational output (OECD 2018). In the German economy, domestic multinational corporations accounted for about 23.5 percent of total output in 2016.¹ This share has risen slightly from 21.5 percent since 2008 (OECD 2020).

Despite the absence of representative data, so far, researchers have analysed different pieces of available data with different methods and have again and again concluded that the multinational corporations' reported profits are not well aligned with their economic activity across countries (e.g. Cobham & Janský 2019, Riedel 2018). Uncertainties remain about the extent and patterns of misalignment. In order to get closer to consensus estimates of the latter, we analyse a sample of German-based multinational corporations and their foreign affiliates based on data collected by the Deutsche Bundesbank. We obtain this sample by matching partly confidential balance sheet data from the JANIS database (Becker et al. 2019) to confidential data on foreign direct investments from the MiDi database (Blank et al. 2020) using the matching IDs provided by Deutsche Bundesbank (Schild et al. 2017). Our main sample includes on average 1236 German parent companies per year with 5047 foreign affiliates in 178 jurisdictions for the years 1999-2016.

Based on this sample, we analyse to what extent the location of the multinational corporations' profit is aligned with the location of their economic activities. We find that the misaligned profits on average amount to 10-13 percent of the sample's total profits. The intensity of misalignment with regard to the location of assets and turnover has increased over time but no such trend can be observed with regard to the location of employees. The distribution of misaligned profits across countries confirms the outstanding role of EU tax havens which attract a large share of excess profits. In contrast, German multinational corporations report much more economic activity than profits in Eastern European countries, most developing countries and some big European countries. For the German parent companies the pattern of misalignment is less clear depending on the activity measure we use.

¹ The respective share of foreign affiliates was 19 percent in 2016. Domestic non-MNCs still produce the largest share of output but it has declined slightly from 58.5 in 2008 to 57.6 in 2016 (OECD 2020).

With our results, we hope to contribute to a growing literature on global profit misalignment (e.g. Cobham/Janský 2019, Janský 2020) or the potential effects of formulary apportionment of the international distribution of corporate tax base (e.g. Fuest, Hemmelgarn et al. 2006, Cobham/Loretz 2014) and profit shifting by German-based multinational corporations (e.g. Weichenrieder 2010, Gumpert et al. 2015, Finke 2013). The relatively small misalignment of profits reported by German parent companies might also be in line with results by Dischinger et al. (2014) who found that multinational corporations might be reluctant to shift profits out of their headquarters. We are not able to attribute the observed extent of misalignment to particular reasons. Profit shifting is only one of several possible explanations. Still, the outstanding role of the world's tax havens in our sample points into this direction and thus requires further explanation.

The paper is structured as follows: Section 2 discusses how our approach relates to the existing literature on profit misalignment, formulary apportionment and profit shifting. Section 3 describes our data and section 4 our methodology. Section 5 summarizes and discusses our results including the global scale of misalignment, the development of the intensity of misalignment over time and the distribution of misaligned profits across countries. Sub-section 5.3. analyses the German parent companies in more detail. Section 6 provides some robustness checks based on an alternative sample. Section 7 concludes.

2. Related Literature

A growing literature explores the inconsistencies between the location of multinational corporations' declared profits and their economic activities across countries. This includes descriptive studies on corporate profit 'misalignment' which analyse the scale and patterns of these inconsistencies based on firm-level data (Cobham/Janský 2019; Janský 2020) and studies on the potential effects of unitary taxation based on formulary apportionment of the corporate tax base (Fuest, Hemmelgarn et al. 2006, Devereux/Loretz 2008, Clausing/Lahav 2011, Cobham/Loretz 2014).

Analysing profit misalignment by U.S. multinational corporations, Cobham and Janský (2019) find that profits reported by their German-based affiliates should be more than twice as high if they were aligned with economic activity in terms of assets, employees and turnover reported in Germany. Profit shifting might not be the only reason for this profit misalignment. A possible way to control for (unobserved) country-specific factors that might explain below-average profitability is to compare the profitability of local and foreign-owned firms by country. Based on national accounts data, Tørsløv et al. (2018) find that in relation to their wage cost, foreign-owned firms make significantly less profits than local firms in most of the countries while the opposite is true for companies based in tax havens. A similar idea is brought up by Finke (2013) who establishes a profitability gap between multinational and non-multinational companies in Germany based on propensity score matching.

The misalignment of profits and activity has also been examined in policy-oriented studies: Policy debates about potential reforms of the international system of corporate tax brought up proposals of redistributing the corporate tax base across countries with the help of formulary apportionment to ensure that multinational profits are taxed where their actual economic activity takes place. In its proposal for the Common Consolidated Corporate Tax Base (CCCTB), the European Commission's suggested a formula which would measure economic activity by equally weighting the three factors real assets, sales and

employees. The employee factor is split into 50 percent head count and 50 percent payroll (European Commission 2016). In order to estimate the distributional implications of formula apportionment in the EU, Fuest, Hemmelgarn et al. (2006) analyse a sample of German multinational corporations based on FDI data from MiDi, and corporate balance sheets from USTAN and Hoppenstedt databases. For the years 1996 to 2001, they find that Germany would gain about 6 percent of its multinational tax base if profits were aligned with activity while the Netherlands, Belgium and Ireland would lose a lot. In a similar way Cobham and Loretz (2014) analyse a sample from the Orbis database.

Most econometric studies analysing the discrepancies between multinational corporations' reported profits and activity are driven by the wish to isolate a tax effect from other country-specific or firm-specific factors and an unexplained residual. A common research design is to estimate the (semi-)elasticity of pre-tax income of multinationals' affiliates to a tax incentive variable. As noted by Dharmapala (2014), the most influential approach ("Hines-Rice approach" following Hines and Rice (1994)) is to regress the observed pre-tax income of multinationals' affiliates on measures of their capital and labour inputs, a measure of a tax incentive (such as the tax rate difference between the parent and the affiliate) and country-level (or affiliate-level) controls (see Riedel 2018 for a comprehensive overview). "Hines-Rice"-type studies, producing also explicit results for German-based companies, are for example Huizinga et al. (2008) and Weichenrieder (2009). The "Hines-Rice" type identification of profit shifting is however limited by problems with the operationalisation of the tax incentive variable. Nominal tax rates do not necessarily reflect the true tax-attractiveness of tax havens for multinational companies and estimates of effective tax rates are available for a limited number of countries and years and not necessarily very reliable. More comprehensive measures of tax attractiveness such as the Tax Attractiveness Index (Institute for Taxation and Accounting at LMU Munich) and the Corporate Tax Haven Index (Tax Justice Network 2019) have become available only recently. Also, many econometric identification strategies build on variation of the tax attractiveness over time and are therefore more likely to identify increases in profit shifting rather than the time-invariant share of shifted profits which then needs to be extrapolated based on strong assumptions. Other authors focus on specific channels of profit shifting, such as the use of internal debt (Buettner, Overesch et al. 2009, Buettner and Wamser 2013, Reiter, Langmayr et al. 2020). They provide convincing evidence of German MNCs profit shifting strategies but are not necessarily suitable for deriving estimates of the overall level of profit shifting. For these reasons, we believe that descriptive analyses of corporate profit misalignment still are a valid contribution also to the profit shifting literature, in the sense that they may serve as an upper bound of profit shifting estimates despite the absence of clear identification.

Another research gap to which we hope to contribute with this study is the profit shifting behaviour of parent companies. As pointed out by Tørsløv et al. (2018), the global Foreign Affiliate Statistics have been improved significantly and have allowed them to obtain a macro picture of foreign affiliates' reported profits and economic activities at a global scale. The recently published OECD AMNE database, on the other hand, now allows to distinguish domestic economic activities of domestic multinational and non-multinational corporations at a macro scale for the first time. Apart from that, information on European parent companies can only be obtained from private micro databases such as Orbis and Amadeus and is far from comprehensive.

A special role of parent companies is not explicitly discussed in many studies. Huizinga et al. (2008) use a sample of European parent companies and their subsidiaries. For German-based companies, they find a below-average semi-elasticity of pre-tax profits with respect to the tax rate of 0.28. Based on this elasticity, they estimate that about 13.6 percent of multinational profits are shifted out of Germany. The average estimated elasticity does not change significantly whether based on affiliates alone or including also the parent companies. This result would thus not support asymmetries in the direction of profit shifting between parent and subsidiary. In contrast, Dischinger et al. (2014) find that profit shifting activities between parent and subsidiary are not symmetric in the sense that they tend to be larger when the parent's location has a lower corporate tax rate but less important when the subsidiary's location has a lower corporate tax rate. They argue that there might be a bias in the location of profits and profitable assets in favour of the headquarter firm. They suggest as possible explanation that headquarters' managers might prefer having funds and valuable assets under direct control at their host location. Second, they argue that companies might try to avoid taxes on the repatriation of profits, e.g. dividend withholding taxes in the source country. Also, Dharmapala and Riedel (2012) who analyse a sample of European parent companies and their foreign affiliates, produce estimates of profit shifting that lie at the lower end of the range of semi-elasticities from the profit shifting literature. Our analysis of profit misalignment by German parent companies points into the same direction.

3. Data

3.1. German parent companies and their foreign affiliates

In order to analyse the extent and patterns of profit misalignment, we use a sample of German-based multinational corporations and their foreign affiliates based on data collected by the Deutsche Bundesbank. These include confidential data on foreign direct investments from the MiDi database (Blank et al. 2020)² and a combination of confidential and publicly available balance sheet data from the JANIS database (Becker et al 2019)³. The Deutsche Bundesbank provides a table of matching IDs which allows researchers to match company information from the two databases (Schild et al. 2017). Like Fuest, Hemmelgarn et al. (2006), we obtain the sample by matching balance sheet data of German-based multinational corporations to data on their foreign affiliates from the MiDi database.⁴ While Fuest, Hemmelgarn et al. used balance sheet data from the USTAN data base, we use the JANIS database which is a new and more comprehensive version of USTAN.

The JANIS database includes annual balance sheet information of German-based non-financial corporations. Part of the information is collected by domestic credit institutions which report the annual

² Blank, S., Lipponer, A., Schild, C.-J., & Scholz, D. (2020). Microdatabase Direct Investment – a Full Survey of German Inward and Outward Investment. *German Economic Review*, forthcoming (available online ahead of print). https://www.degruyter.com/view/journals/ger/ahead-of-print/article-10.1515-ger-2019-0123/article-10.1515-ger-2019-0123.xml?rskey=Ru9ajv&result=10&tab_body=fullHtml-75008

³ Becker, T., Biewen, E., Schultz, S. and Weisbecker, M. (2019). Individual financial statements of non-financial firms (JANIS) 1997-2017, Data Report 2019-10 – Metadata Version 2. Deutsche Bundesbank Research Data and Service Centre.

⁴ Likewise, other authors have combined MiDi and USTAN data to study different aspects of MNCs' behaviour (e.g. Becker, Ekholm et al. 2013, Jäckle/Wamser 2010).

financial statements of corporations to the Deutsche Bundesbank as part of the Bundesbank's credit assessment system. Domestic credit institutions likely report corporations with a relatively high creditworthiness which are thus not representative of the total population of corporations. However, the JANIS database also includes financial statements from public sources which improves its representativeness with respect to the USTAN database. The inclusion of confidential data and the quality controls executed by the Deutsche Bundesbank make the dataset attractive for research on German-based companies.

The MiDi database collects firm-level data on inward and outward foreign investments. On the outbound side, German companies report key statistics on their foreign investment enterprises. Reporting is obligatory for firms with a balance sheet total of more than 3 million EUR and above certain foreign participation thresholds so that the data covers the population above these thresholds. The MiDi does not include balance sheet information on the German parent companies which is why we match it to the JANIS sample.

Our data covers a significantly lower share of firms than the Orbis database. The advantages of our data are free-of-charge access and reliability due to strict quality controls by the Deutsche Bundesbank. Our data includes some confidential firm-level data that are not necessarily included in Orbis as well as parent-affiliate relationships that might not be included in Orbis as the reporting of foreign affiliates is obligatory in the MiDi database. In contrast to the FATS, our data covers also German parent companies. The main contribution of our paper is thus, on the one hand, to validate results of other researchers based on a different piece of data. On the other hand, we specifically examine the pattern of misalignment between German parent companies and their foreign affiliates. Estimates of profit misalignment based only on foreign affiliates might underestimate the scale of the phenomenon. At the same time, patterns of misalignment might differ between parent companies and foreign affiliates (Dischinger et al. 2014).

Our variables of interest include profits, number of employees, assets, and turnover as a proxy for sales. Our choice of variables is limited by the availability of variables in the MiDi dataset. In order to measure economic activity, we use the variable "number of employees" as compensation of employees is not available for the foreign affiliates. We use tangible and intangible assets to proxy capital input. Unfortunately, tangible and intangible assets of the foreign affiliates are not reported separately. Our preferred pre-tax profit variable from the JANIS database is the "result from ordinary activities" which does not have an equivalent in the MiDi database. The latter only includes profits after taxes but prior to profit distribution, and offsetting of losses carried forward. We gross up the after-tax profit with the foreign tax rate in order to make them more comparable to the German parent's pre-tax profits. As in Fuest, Hemmelgarn et al. (2006) we use the statutory tax rates which we obtain from KPMG (2020a).

Assuming that profits were effectively taxed at the statutory rate might lead to an overestimation of foreign profits with respect to the German pre-tax profits. As a robustness check, we thus use also backward-looking effective tax rates (ETR) by Janský (2019) and García-Bernardo et al. (2020). Using the ETR might be more appropriate for obtaining an equivalent to the pre-tax profits reported in the JANIS database as the ETR are calculated based on the accounting profit. As the ETR are lower than the statutory rates, using the ETR likely reduces the share of profits reported in Germany with respect to the results based on statutory rates. However, the ETR are available only for a limited number of countries, excluding

the U.S., many tax havens and lower income countries which leads to an omission of about 1000 affiliates in the later years of the sample. Disregarding affiliates in these countries might lead to a distortion with the direction of the distortion being unknown.

3.2. The sample

For our analysis, we exclude companies from banking, finance and insurance industries, as well as public administration and defense. We drop sole proprietors and “other legal forms” which include foundations, registered associations and municipal companies. In the matching process, many observations are lost.⁵ Firms tend to appear in JANIS for shorter time periods than in MiDi. In contrast to JANIS, reporting is obligatory in the MiDi so many firms are actually included since 1999, the first year of the dataset. Also, some firms with foreign direct investments are not included in JANIS. Conversely, not all firms in JANIS do necessarily have foreign affiliates. After the elimination of non-matched observations, our sample includes on average about 2100 German-based companies per year with about 8800 foreign affiliates for the years 1999-2016. We drop companies which have made losses on average over the sample period. We also drop subsidiaries in countries for which no tax rate data is available. As a consequence, we obtain different samples for the statutory and effective tax rates. Roughly 60 percent of all parent-year observations are from the manufacturing sector and about 30 percent from the service industries. This holds for both samples.

The final sample based on statutory tax rates includes on average 1236 German parent companies per year with 5047 foreign affiliates in 178 jurisdictions. For a rough comparison: the sample’s total profits in 2016 amount to about EUR 73 bn⁶. The gross operating surplus of the total German economy as obtained from the national accounts amounted to EUR 1202 bn in the same year (European Commission 2020). The final sample based on effective tax rates includes on average 1230 parent companies and 4784 affiliates in 62 countries (table 1). If we compare the sample size for the period 2011-2015 which is the only period in which effective tax rates are available, we can see that the sample based on statutory tax rates covers much more foreign affiliates with about 1394 parent companies and 5824 affiliates on average. For this reason, we use the sample based on statutory rates as our main sample and report details on the sample based on ETR in the robustness checks section. Due to the confidentiality requirements by the Deutsche Bundesbank, we have to group individual country results into larger aggregates such as “Eastern Europe” or “rest of world” if the number of observations for each country and year is too low or if an individual firm observation dominates the aggregate value of the country.

⁵ In the matching process we loose 1467683 firm-year observations which are either not included in JANIS or not included in MiDi. We obtain 122660 matched firm-year observations.

⁶ We would have preferred to compare to the gross output from the sample to gross output of domestic MNE from the AMNE database. However, we do not have access to gross output information for our sample at the moment of writing. Turnover is unfortunately not included in AMNE. Another shortcoming is that we include as MNE all firms with affiliates above an ownership threshold of 10%. The AMNE and FATS use only majority-owned affiliates as reference group. Thus, the numbers are not comparable as long as we cannot split the sample according to the ownership threshold.

Table 1: Sample based on statutory tax rates

Parent companies					
parent observations	average profits	average number of employees	average assets	average turnover	
	in million EUR		in million EUR	in million EUR	
1999	1249	32	1359	92	341
2000	1286	22	1157	90	363
2001	1340	26	1104	90	381
2002	928	31	1377	124	507
2003	905	29	1241	120	520
2004	962	29	1369	113	511
2005	1072	32	1206	99	497
2006	1188	31	1226	89	523
2007	1221	53	1202	89	551
2008	1265	34	1102	86	520
2009	1252	26	1091	76	492
2010	1297	53	1067	75	554
2011	1356	52	1047	79	629
2012	1380	50	1049	83	685
2013	1378	42	1035	88	672
2014	1428	46	1009	88	651
2015	1430	38	904	90	607
2016	1309	56	1088	97	701
Foreign affiliates					
affiliate observations	average profits	average number of employees	average assets	average turnover	
	in million EUR		in million EUR	in million EUR	
1999	4650	4	163	12	62
2000	4952	8	180	20	71
2001	5246	4	186	23	75
2002	3475	9	267	31	114
2003	3754	8	264	24	105
2004	3893	8	245	20	102
2005	4447	8	264	24	115
2006	4813	9	255	23	114
2007	4979	10	254	21	106
2008	5202	6	260	24	94
2009	5140	5	246	22	82
2010	5323	10	256	26	106
2011	5541	13	267	28	121
2012	5690	13	275	30	125
2013	5771	11	283	30	126
2014	5979	13	284	33	135
2015	6139	14	278	36	135
2016	5857	15	288	41	144

Source: MiDi, JANIS, based on own calculations

4. Methodology

Our methodological approach builds on Cobham and Janský (2019). The term ‘misaligned profit’ describes the share of profits reported in a country that is not in line with the share of economic activity reported in the respective country. We compute each country’s share in the total profits of the sample and compare it to each country’s share in total economic activity measured in terms of number of employees, tangible and intangible assets, and turnover. We also use a weighted measure of activity (‘CCCTB’) which is weighted one-third tangible and intangible assets, one third turnover and one-third number of employees. This is similar to the formula proposed by the European Commission (2016) for the Common Consolidated Corporate Tax Base (CCCTB). However, due to data limitations our CCCTB measure does not exactly correspond to the European Commission’s proposal. For example, we cannot split the factor ‘employees’ between compensation costs and number of employees and we cannot distinguish between tangible and intangible assets in our data.

As in Cobham & Janský (2019), we compute the misaligned profit by country in the following way:

$$\text{Misaligned profit} = \text{share of economic activity} * \text{total global gross profits} - \text{actual gross profit}$$

If actual profits are higher than what would be estimated based on the share of economic activity, this gives rise to ‘excess’ profit. If actual profits are lower than what would be estimated based on economic activity, this gives rise to ‘missing profit’. In order to measure the overall scale of misalignment, we compute how much profit is in the ‘wrong’ place by adding up the “excess profit” of jurisdictions where there is no concomitant economic activity.

The intensity of misalignment is an alternative way to measure misalignment (Cobham & Jansky 2019). If profits were perfectly aligned with economic activity, this would give rise to a perfect correlation of 1. A correlation of -1 would imply perfect misalignment. For our measure of the relative intensity of misalignment, we compute 1 minus the correlation of factors of economic activity with gross profits across countries and over time. In case of perfect correlation, this measure would equal zero.

In addition to the global scale and intensity of misalignment, we also analyse the distribution of misalignment across countries. For this reason, we also report each country’s missing or excess profit in absolute values and as a percentage of the total profits reported in the country. The first gives us an idea of how relevant the country’s misaligned profits are in relation to the total amount of misaligned profits. The second indicates the relevance of misalignment from the point of view of the individual country.

5. Results

5.1. Global misalignment of German MNC's profits

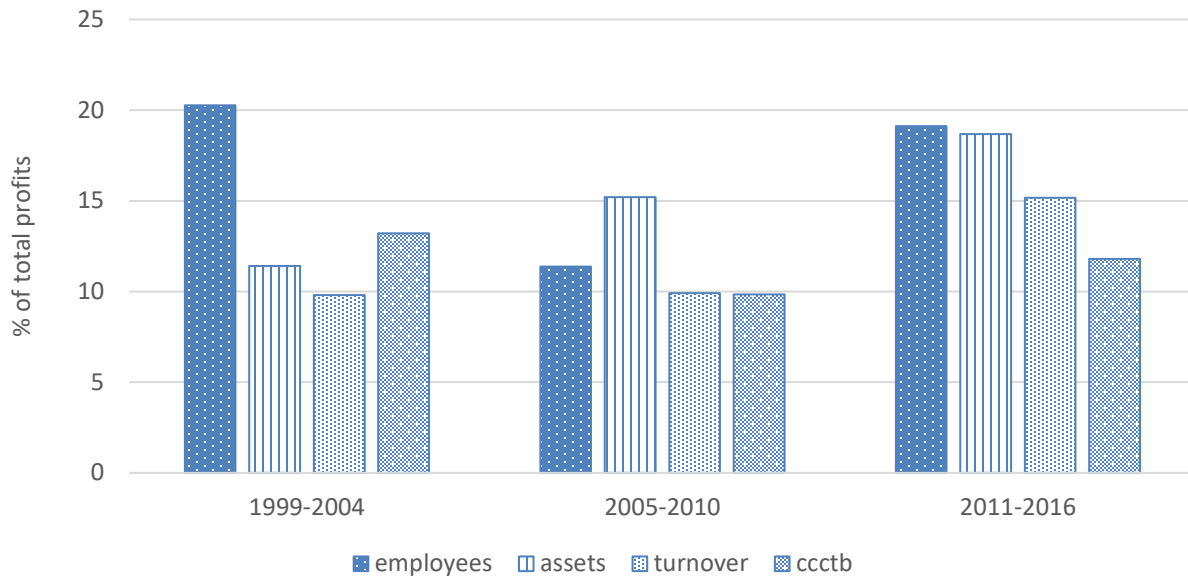
Figure 1 shows the sum of excess profits by various measures of economic activity. Those are the profits of our sample's multinational corporations that would need to be declared in other jurisdictions in order to be aligned with economic activity. In absolute numbers, the misaligned profits have increased over the sample period from about EUR 47 bn on average in 1999-2004 to about EUR 100 bn in 2011-2015 when measured in terms of equally weighted factors of activity (CCCTB). As a percentage of the sample's total gross profits, the picture looks a bit different. When measured in terms of equally weighted factors of activity, misaligned profits amounted to about 13 percent on average in the period 1999-2004, decreased to about 10 percent in the period 2005-2010 and increased again to about 12 percent in 2011-2016 (figure 2). This development is mainly driven by the strong misalignment of profits with regard to the location of employees in 1999-2004, which has not been as high in the later periods. In contrast, misalignment of profits with regard to the location of assets and turnover has either remained constant or increased on average over the periods 2005-2010 and 2011-2016.

Figure 1: Misaligned profits in absolute values, based on NCTR



Source: MiDi, JANIS, KPMG, own calculations

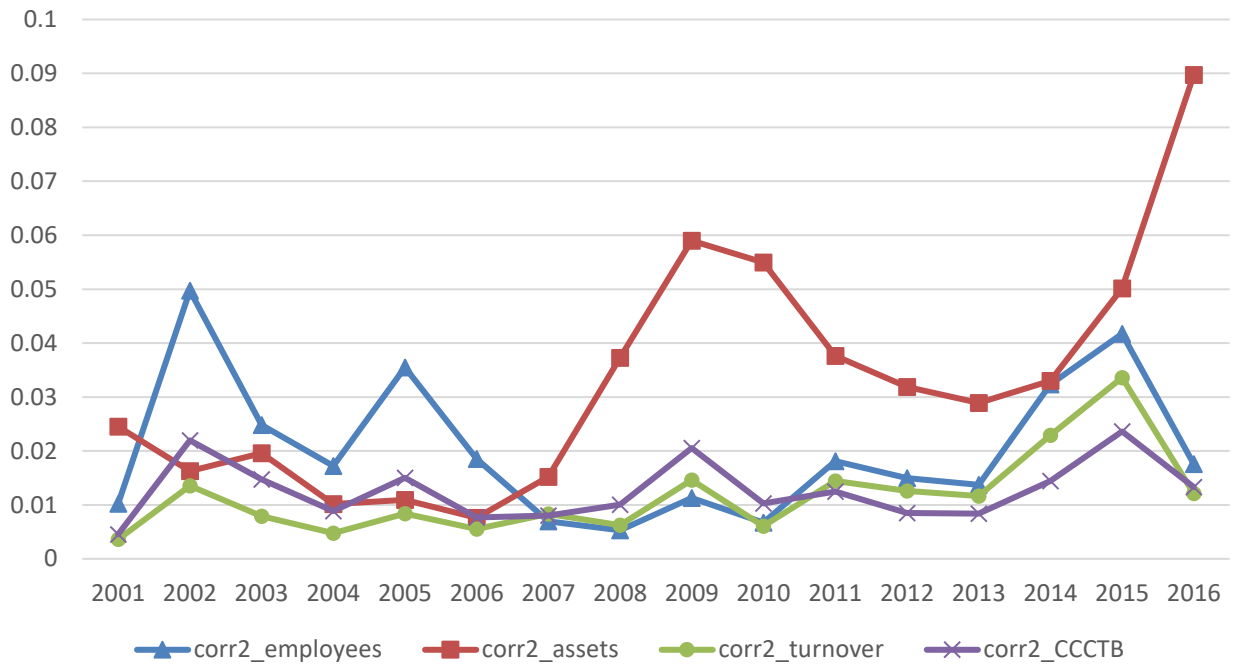
Figure 2: Misaligned profits in %, based on NCTR



Source: MiDi, JANIS, KPMG, own calculations

Figure 3 shows the relative intensity of misalignment. Remember that in case of perfect correlation, this measure would equal zero. For most years, the intensity of misalignment varies between 0 and 0.05 which is broadly in line with the scale of the intensity of misalignment measured by Cobham & Janský who analysed U.S. multinational corporations and their foreign affiliates. When measured in terms of assets and turnover, the intensity of misalignment seems to be on an upward trend since 1999 and on a slight upward trend when measured in terms of equally weighted factors (CCCTB). However, when measured in terms of employees, an overall trend is not observable, as the misalignment has decreased until 2008 and increased again afterwards. The strong spikes of the intensity when measured in terms of employees and assets, might point to weaknesses in the data. Apparently, changes in the sample or individual observations have a strong impact on our misalignment measure. The spike of misalignment between 2008 and 2010 is, however, consistent with results by Cobham and Janský and probably caused by the financial crisis. In 2009, profits dropped sharply, which we do not observe for the foreign affiliates' assets to the same extent. As a consequence for the period 2008-2010, the development of assets does not explain the drop in reported foreign profits well, which likely drives up our intensity of misalignment. In contrast in 2016, the spike in the intensity of misalignment in terms of assets is driven by a jump in average profits that is not accompanied by a similar jump in assets. Despite these year-to-year irregularities, the broader pattern of the intensity of misalignment is in line with the upward trend observed for the 6-year averages of assets and turnover. It suggests that there is no overall trend of misalignment when measured in terms of employees but that the intensity of misalignment when measured in terms of equally weighted factors shows a slight upward trend which is masked by the 6-year-average values in figure 2.

Figure 3: Intensity of misalignment, 2001-2016



Source: MiDi, JANIS, KPMG, own calculations

5.2. International distribution of misalignment

Table 2 compares the share of each country in total profits of the sample with its share in total activity. German parent companies account for about 46 percent of the total gross profits when calculated with the statutory tax rates. Germany's share of assets is lower than its share of profits, while its share of turnover and employees are higher than its share of profits. When we compare Germany's share of profits to its share of activity measured by equally weighting employees, assets, and turnover (CCCTB), Germany seems to belong to the missing profit countries. However, this is not robust to the use of ETR as we will see in the robustness check section. In addition, the relative weight of Germany's excess profit is not high, amounting to about 2 percent of its total gross profits only (figure 6). As a consequence, we consider Germany as a mixed case.

Table 2: German MNC's global distribution of profits and economic activity, 2011-2016, based on statutory tax rates

Country	observations	share of profits	share of employees	share of assets	share of turnover	share of activity CCCTB
Germany	8281	45.98	47.62	38.57	54.28	46.82
United States	2796	10.42	4.65	20.38	7.99	11.01
China	2629	12.11	7.36	7.37	7.47	7.40
France	2134	1.09	1.62	1.15	2.05	1.61
United Kingdom	1979	2.51	1.79	2.96	3.41	2.72
Austria	1952	1.63	1.66	1.63	1.44	1.58
Switzerland	1470	1.69	1.09	1.90	1.65	1.55
Czech Republic	1380	1.16	2.72	2.08	1.31	2.03
Poland	1347	0.60	1.77	1.18	1.00	1.32
Italy	1294	0.47	0.76	0.85	1.25	0.95
Spain	1253	0.85	1.81	1.76	1.76	1.78
Hungary	708	1.16	1.78	1.74	1.00	1.51
India	693	0.52	2.23	0.53	0.51	1.09
Belgium	671	0.51	0.51	0.92	0.69	0.70
Singapore	567	0.47	0.37	0.35	0.73	0.49
Japan	534	1.32	2.13	2.03	2.06	2.07
Australia	518	0.66	0.33	0.51	0.50	0.44
Brazil	480	0.32	1.38	0.56	0.54	0.83
South Africa	442	0.47	0.66	0.42	0.56	0.55
Turkey	425	0.42	1.10	0.56	0.51	0.73
Slovakia	403	0.21	0.89	0.59	0.58	0.69
Denmark	340	0.18	0.16	0.26	0.19	0.20
Portugal	336	0.32	0.45	0.26	0.30	0.34
Malaysia	335	0.35	1.02	0.57	0.28	0.62
Thailand	275	0.20	0.23	0.15	0.18	0.19
Slovenia	200	0.10	0.25	0.16	0.12	0.18
Argentina	180	0.17	0.25	0.08	0.14	0.15
Indonesia	178	0.07	0.40	0.06	0.08	0.18
Chile	163	0.07	0.14	0.08	0.06	0.09
Rest of world aggregated by regions						
Eastern Europe	2109	2.12	5.38	2.54	1.98	3.30
Latin Amer.Carib.	821	0.51-	1.64	1.28	0.97	1.29
Asia	802	0.58	0.77	0.73	0.68	0.73
Middle Eastern	616	0.60	0.45	0.44	0.30	0.40
EU tax havens	608	2.11	0.32	1.05	0.34	0.57
Tax havens	569	0.57	0.21	0.06	0.24	0.17
Africa	382	0.14	1.29	0.30	0.19	0.60
RoW	3450	12.62	8.99	8.64	8.44	8.69

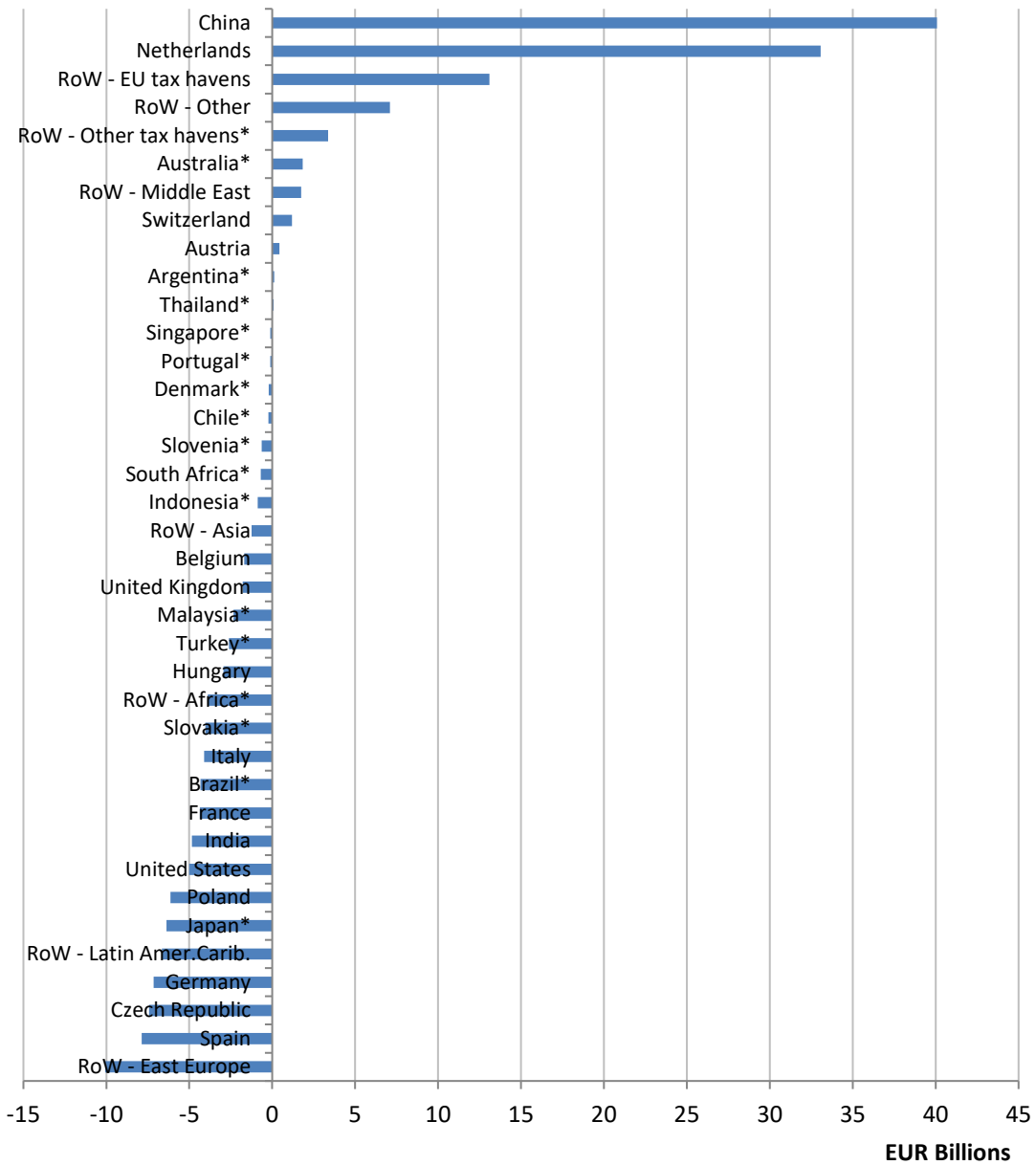
Source: MiDi, JANIS, KPMG, own calculations

The following section presents each country's missing or excess profit in bn EUR and as a percentage of the total profits reported in the country. We highlight only those country results that are consistent based on both statutory and effective tax rates if available (for details see robustness check section).

The figures 5 and 6 illustrate the results by country both in absolute and relative numbers. The most striking cases of excess profits are China, the Netherlands and the world's tax havens. China accounts for about EUR 40 bn of excess profits or 39 percent of its gross profits. This is followed by the Netherlands with about 33 bn of excess profits or 77 percent of its gross profits. The other EU tax havens, Luxembourg, Ireland, Cyprus and Malta account for about EUR 13 bn of excess profits or 73 percent. The rest of world tax havens account for about EUR 3 bn of excess profits or 70 percent of their gross profits. Also Norway, as a large oil exporter, is an excess profit country. In the main sample, Norway is included in "rest of world" due to the confidentiality requirements of the Deutsche Bundesbank. Australia and the Middle East are also clearly part of the excess profit countries with about 33 and 34 percent of their profits being misaligned with economic activity.

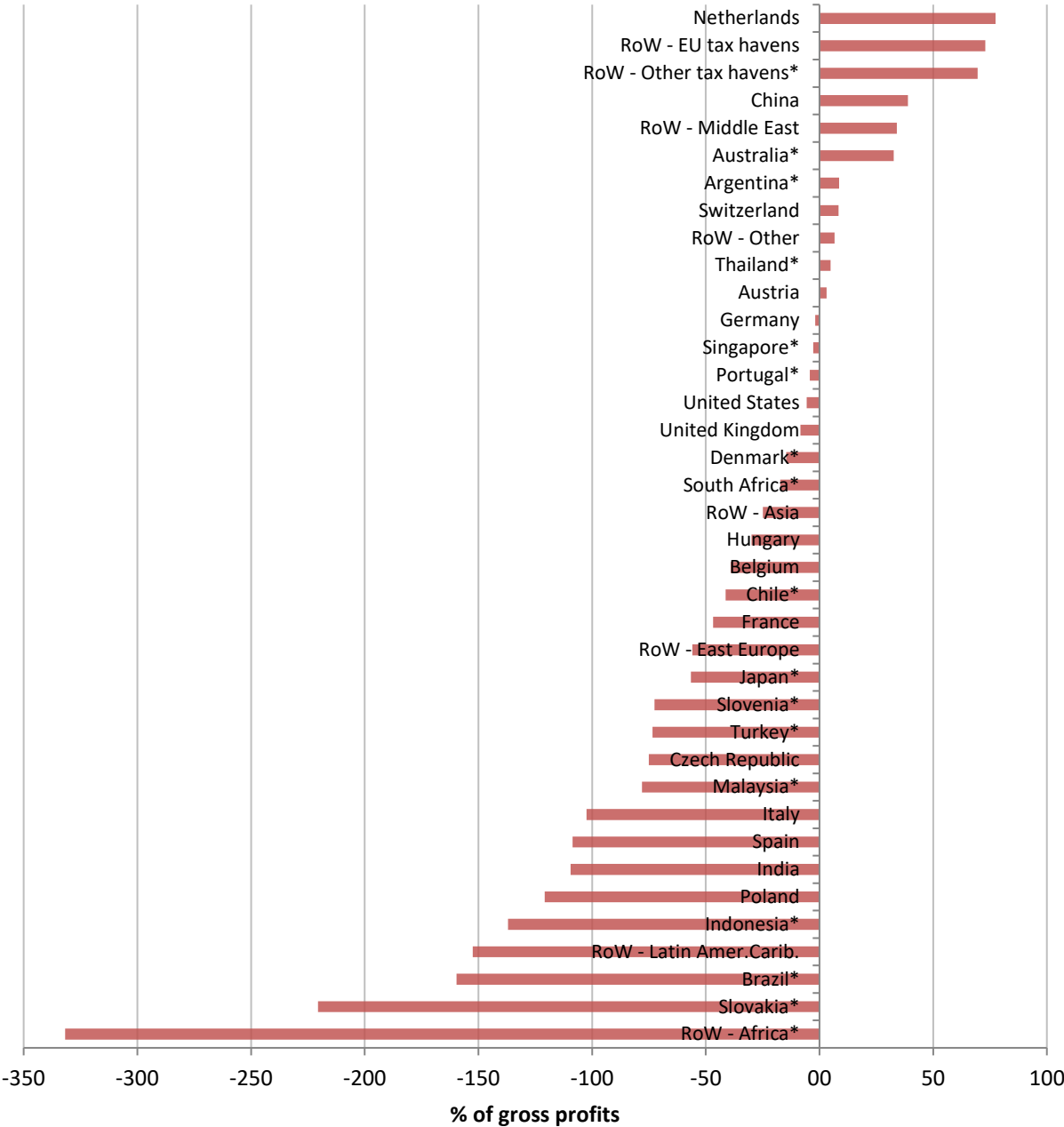
The countries which account for the largest shares of missing profits are Eastern European countries, Spain, and the aggregate of Latin American and Caribbean countries. Czech Republic's missing profits amount to about EUR 7 bn or 74 percent. Spain loses about EUR 8 bn or 109 percent. Countries from Latin America or the Caribbean which are not individually included in the graphs lose about EUR 6 bn or 152 percent on aggregate. In absolute numbers, Japan and Poland lose about EUR 6 bn which correspond to 57 and 121 percent of their profits. Likewise, France and Italy are missing profit countries with about EUR 4 bn each and shares of missing profits in their total profits of 47 and 102 percent respectively. When measured as a share of the total profits reported in their countries, African countries, Slovakia and Latin American countries are the top missing profit countries. African countries which are not individually included in the graphs lose about EUR 4 bn on aggregate which translate into a share of 332 percent of their aggregate profits (with respect to a situation where profits would be perfectly aligned with economic activity). But also Indonesia, Poland, India, Spain and Italy rank high with more than 100 percent of their profits misaligned. Note that for many countries the number of observations is below 100 companies per year which is why they are marked with an Asterix in the graphs.

Figure 4: Excess profits and missing profits in bn. EUR, based on NCTR, 2011-2016



Source: MiDi, JANIS, KPMG, own calculations

Figure 5: Excess profits and missing profits in % of gross profits, based on NCTR, 2011-2016



Source: MiDi, JANIS, KPMG, own calculations

Our key results regarding the international distribution of misalignment are broadly in line with the academic literature. The classification of large high-tax countries and most developing countries as missing-profit countries as well as the outstanding role of the world's tax havens as excess-profit countries is also well documented by Clausing (2016), Tørsløv et al. (2020), Cobham and Janský (2019) and others. However, our results suggest, that German MNCs have slightly different regional patterns of tax avoidance than U.S. MNCs. While the Netherlands are the number one for both German and U.S. MNCs, Bermuda and Singapore seem to be relatively less important as profit-shifting destinations for German MNCs. The predominance of EU tax havens among our excess-profit countries supports the hypothesis of geographical specialisations of tax havens as suggested by Fichtner, García-Bernardo et al. (2017) and might further stimulate the debate about the empirically controversial tax benefits of using the Netherlands as a conduit jurisdiction (Weyzig 2013, Lejour et al. 2019).

It might be surprising that Eastern European countries are missing-profit countries according to our results. As most of them have rather low corporate tax rates, the incentive to shift profits out of Eastern Europe should not be very strong. On the contrary, they might even attract paper profits from higher-tax countries. However, our results suggest that the latter is not the case. Research by Nerudová, Dobranschi et al. (2020) even suggests that Czech Republic, Poland, Slovakia and Hungary loose tax revenues due to profit shifting activities of MNCs which makes our results even more plausible. Possibly, a generally low corporate tax rate is not sufficient to compete with the 'sweetheart deals' offered to individual MNCs by tax haven jurisdictions.

The classification of China as an excess-profit country and the scale of the misaligned profits in China are a bit puzzling and might require further analysis. One possible explanation is that FDI in China is often held in Joint Ventures with Chinese companies and that German ownership is often limited to minority stakes due to the strict regulation of FDI (Hanemann/Huotari 2018). Co-ownership of the Chinese investors might limit the scope for profit shifting. In addition, for many companies the incentive to shift profits out of China might be lower than expected as reduced CIT rates apply for companies in various sectors, regions and projects (KPMG 2020a) and for research and development (KPMG 2020b).

However, it might also be the combination of the relatively low cost of labor and capital combined with increasingly high value-added activities that contributes to the relatively higher share of profits in China. This points to a possible weakness of our approach as we cannot control for the distribution of value added along the global value chain.

5.3. Are parent companies different?

The results do not allow for a clear categorization of Germany as an excess-profit or missing-profit country. If we look at the results based on statutory tax rates, it seems that German parent companies make less profits than would be in line with their economic activity. However, this does not hold for all years and is mainly driven by the high share of global turnover that is reported in Germany. The share of employees is only slightly higher than the share of profits for the years 2011-2016 on average. The share of assets is much lower than the share of profits. When we look at the distribution of profits computed with effective tax rates, it seems that German parent companies report more profits than economic activity for the years 2011-2015. Here, the result is mainly driven by employees and assets. Still, German parent companies

report a higher share of turnover than profits. Accordingly, the result that German parent companies report a higher share of turnover than of profits and a lower share of assets than of profits is consistent across samples, the misalignment in terms of employees and the result for equally weighted factors are not.

If we look at the development of profits and activity reported in Germany over time, we also find a mixed picture. In the years of economic stagnation in the early 2000s German parent companies report less profits than activity (CCCTB) which changes after 2006 (figure 7). As a robustness check, we drop parent companies with less than 250 employees and their affiliates. The picture changes slightly as excess profits decrease in most years whereas missing profits increase somewhat. It causes a switch from an excess profit to a missing profit country in 1999, 2011 and 2013. However, in comparison to other countries, the share of misaligned profits seems relatively low, varying between 9 and 0 percent in both directions if we exclude the outlier of 2000. This contrasts with estimates found in the literature on foreign affiliates which characterize Germany as a missing profit country and also estimate the share of lost profits to be much higher (e. g. Tørsløv et al. 2018, Cobham & Janský 2019). Our results might be in line with a headquarter bias in profit shifting, in the sense that parent companies rather shift profits among affiliates in order to minimize their global tax payments but do not shift profits out of headquarters or do so to a lesser extent. This would be in line with Dischinger et al. (2014), who find that European multinational corporations are reluctant to shift profits away from their headquarters.

Figure 6: Misaligned profits - Germany, full and big company sample, based on NCTR



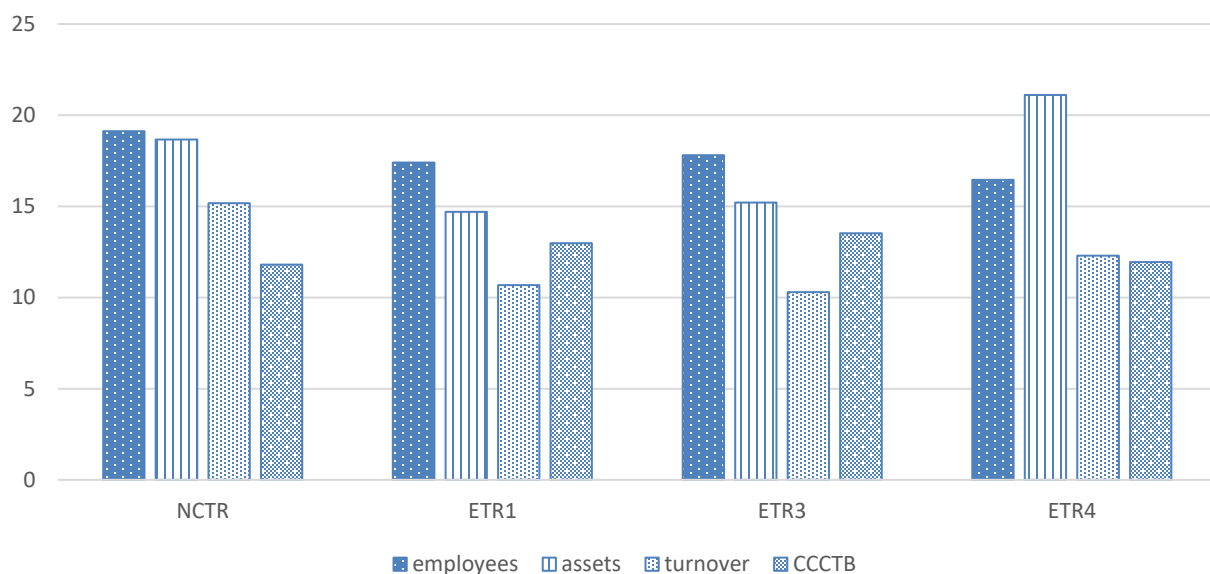
Source: MiDi, JANIS, KPMG, own calculations

6. Robustness checks

As the choice of the tax rate variable affects the grossed-up profits of foreign countries, we repeat our analysis using effective tax rates instead of statutory tax rates. As mentioned above, effective tax rates are lower than statutory tax rates for most countries. For this reason, the share of pre-tax profits of German parent companies is likely to be higher when using ETR. At the same time, ETR are only available for a smaller number of countries, which is why a substantial share of foreign affiliates are missing in this sample (table A1 in the Appendix).

The overall scale of misalignment as a percentage of total profits is broadly similar whether profits are grossed up with statutory or effective tax rates (figure 7). Misalignment varies between 12 percent and 13 percent when measured in terms of equally weighted factors. As with the nominal tax rates, we observe higher misalignment levels for individual factors. When we use the effective tax rates I and III to gross up profits, we obtain slightly higher levels of misalignment (for the equally weighted factors of activity) as compared to using the nominal tax rates.⁷

Figure 7: Misaligned profits, based on NCTR and ETR, 2011-2015



Source: MiDi, JANIS, KPMG, Janský (2019), García-Bernardo et al. (2020), own calculations

As mentioned above, German parents on average account for about 53-56 percent of the sample's total gross profits in the period 2011-2015 (table A1) when computed with ETR. This is in line with our initial assumption that the use of statutory rates might lead to an underestimation of Germany's share of profits.

⁷ We use three different versions of the effective tax rates, with ETR3 and ETR4 serving as lower and upper bounds of ETR estimates as described in García-Bernardo et al. (2020). Note that the sums of net profits of the two country groups "rest of world tax havens" and "rest of world" were grossed up with the group-averages of ETR3 and ETR4 of the respective country group.

When we compare Germany's share of profits to its share of activity measured by equally weighting employees, assets, and turnover (CCCTB), Germany seems to belong to the "excess profit" countries when based on ETR. As a result, we refer to Germany as a mixed case in the conclusion.

Most country results are confirmed by the ETR sample, most notably the top positions (figures A1 and A2). When calculated with ETR1, in China, about 33 percent of profits are misaligned with economic activity, 75 percent for the Netherlands, 84 percent for Luxembourg and 49 percent for the rest of world tax havens. Also Norway and Australia remain excess profit countries.

As many poorer countries are not included in the ETR sample we cannot build the same country aggregates but we see that Latin American and Asian countries are all "missing profit" countries except for China and Argentina. Also here, Eastern European countries have a high portion of missing profits the top countries being Romania with 303 percent of profits missing, followed by Slovakia with 239 percent and Latvia with 225 percent (see figure A1, ETR1, in the Appendix). In absolute numbers, Japan is the top loser with about EUR 8 bn which correspond to 86 percent of its profits (see figure A2, ETR1, in the Appendix). Unfortunately, there is no African country in the ETR sample.

7. Conclusion

In this paper we analyse a sample of German parent companies and their foreign affiliates obtained by matching balance sheet data from the JANIS database to information of foreign affiliates from the MiDi database of Deutsche Bundesbank. In order to measure the overall scale of profit misalignment and the distribution of misaligned profits across countries, we compute each country's share in the total reported profits of the sample and compare it to each country's share in total economic activity measured in terms of number of employees, tangible and intangible assets, and turnover.

We find that the misaligned profits on average amount to 10-13 percent of the sample's total profits. The intensity of misalignment with regard to the location of assets and turnover has increased over time but no such trend can be observed with regard to the location of employees. The distribution of misaligned profits across countries confirms the outstanding role of EU tax havens which attract a relatively large share of excess profits. The most important tax havens for German multinational corporations are the Netherlands, Luxembourg and Ireland. Another striking case are the huge excess profits reported for Chinese affiliates. These point to the need to further analyse the reasons for profit misalignment as the outstanding profitability of Chinese affiliates but also of resource-rich economies is probably not well explained by profit shifting activities.

The countries or country groups for which German multinational corporations report much more economic activity than profits are Eastern European countries, most developing countries and some big European countries such as Spain, Italy and France. The results that most developing countries from Africa, Asia and Latin America can be characterized as missing profit countries and that the missing profits constitute a relatively higher share of their total profits are consistent with previous research on U.S. multinationals. The huge missing profits for Eastern European countries might motivate further research on the organization of German multinationals' value chains in order to explore possible causes for the profit misalignment.

For the German parent companies the pattern of misalignment is less clear depending on the activity measure we use. When measured in terms of assets, the share of profits reported by German parent companies are much higher than their share of economic activity. In terms of turnover, German parent companies on aggregate report a lower share of profits than activity. When measured in terms of employees, Germany would also belong to the missing profit countries. However, this result is not robust to the use of effective tax rates for grossing up net profits. As a result, we would characterize Germany as a mixed case. A possible explanation is that parent companies have a different profit shifting behaviour than affiliates.

A likely limitation of our approach is that our sample of German MNCs is non-random which might cast doubts on the representativeness of our results. Still, we would like to highlight that it is much closer to being representative than samples used in earlier works based on matching MiDi and USTAN due to the improved data availability from the JANIS database. In the absence of representative data on MNCs and in particular on domestic MNCs, researchers can combine information from different pieces of data as a second best. Our results confirm results based on other data with regard to the outstanding role of tax havens as main attractors of global profits and shed more light on their regional specialisations. The relatively low profit misalignment that we find for German headquarters might be a bit more surprising and require further analysis of additional or better data sources. In this sense, the projected publication of CbCR data might open new avenues of research and provide a basis for further robustness checks.

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Appendix

Table A1: Sample based on ETR

Parent companies						
	parent observations	average profits	average number of employees	average assets	average turnover	
	by year	in million EUR	persons	in million EUR	in million EUR	
2011-2015	1230	52	1100	90	613	
Foreign affiliates						
	affiliate observations	average profits	average number of employees	average assets	average turnover	
	per year	in million EUR	persons	in million EUR	in million EUR	
2011-2015	4784	11	274	24	120	

Source: MiDi, JANIS, based on own calculations

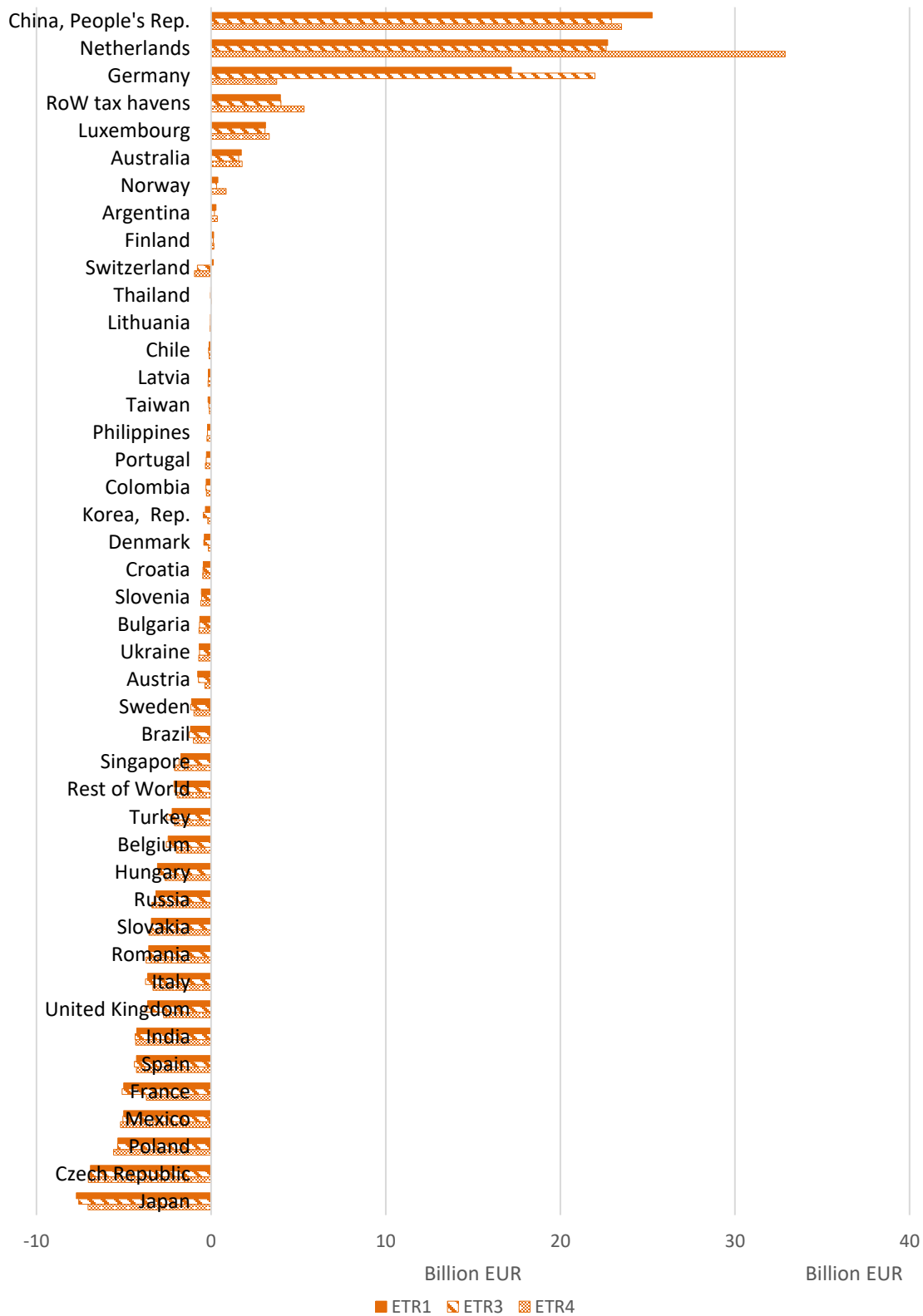
Table A2: German MNC's global distribution of profits and economic activity, 2011-2015, based on effective tax rates

Country	observations	share of profits	share of employees	share of assets	share of turnover	share of activity CCCTB
Germany (parent companies)	6152	55.12	50.76	48.88	56.80	52.14
China	2145	13.33	8.20	9.60	9.05	8.95
France	1839	1.14	1.82	1.75	2.47	2.01
United Kingdom	1644	2.91	2.10	4.17	4.35	3.54
Austria	1551	1.75	1.83	2.13	1.70	1.89
Netherlands	1300	5.27	1.31	1.45	1.26	1.34
Switzerland	1185	1.98	1.27	2.53	2.07	1.95
Czech Republic	1155	1.28	3.10	2.78	1.57	2.48
Poland	1135	0.73	2.11	1.64	1.23	1.66
Italy	1096	0.55	0.93	1.07	1.54	1.18
Spain	980	0.88	1.60	1.64	1.62	1.62
Hungary	592	1.31	1.96	2.35	1.21	1.84
Belgium	566	0.50	0.61	1.30	0.88	0.93
Sweden	565	0.87	1.06	1.39	0.75	1.07
India	557	0.57	2.56	0.74	0.61	1.30
Russia	553	2.03	3.33	2.38	2.02	2.58
Singapore	476	0.46	0.47	0.84	0.96	0.76
Japan	439	1.55	2.75	3.13	2.77	2.89
Mexico	427	0.49	1.67	1.37	1.04	1.36
Australia	422	0.84	0.34	0.69	0.59	0.54
Romania	405	0.20	1.65	0.49	0.33	0.82
Turkey	371	0.58	1.29	0.94	0.66	0.96
Brazil	363	0.57	1.21	0.57	0.56	0.78
Slovakia	336	0.25	1.04	0.77	0.71	0.84

Korea, Republic of	323	0.40	0.26	0.61	0.50	0.46
Denmark	319	0.21	0.20	0.37	0.25	0.27
Portugal	288	0.37	0.55	0.34	0.37	0.42
Thailand	220	0.22	0.27	0.21	0.21	0.23
Finland	192	0.14	0.10	0.13	0.10	0.11
Luxembourg	189	0.64	0.13	0.11	0.08	0.11
Slovenia	162	0.12	0.29	0.21	0.15	0.22
Taiwan	162	0.16	0.16	0.21	0.19	0.19
Norway	158	0.20	0.09	0.18	0.11	0.13
Argentina	157	0.25	0.30	0.11	0.18	0.20
Bulgaria	137	0.10	0.33	0.23	0.09	0.21
Croatia	134	0.06	0.16	0.20	0.07	0.14
Chile	117	0.08	0.14	0.10	0.07	0.10
Ukraine	99	0.07	0.42	0.07	0.06	0.18
Philippines	70	0.03	0.11	0.05	0.03	0.06
Latvia	67	0.01	0.06	0.04	0.02	0.04
Lithuania	66	0.02	0.04	0.03	0.02	0.03
Colombia	57	0.04	0.10	0.10	0.07	0.09
RoW tax havens	335	1.39	0.25	1.50	0.36	0.71
Rest of World	566	0.31	1.07	0.63	0.32	0.68

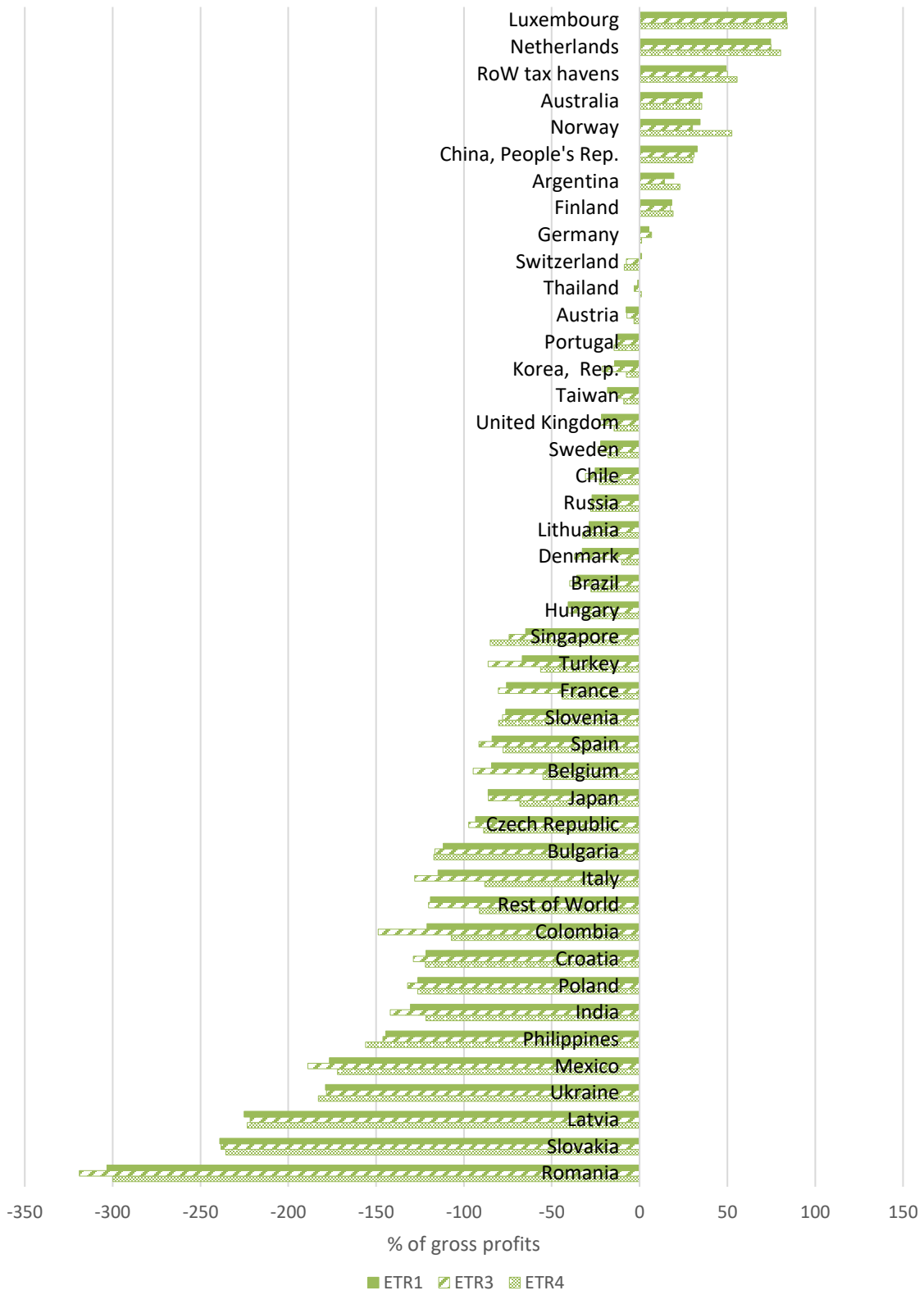
Source: MiDi, JANIS, Janský (2019), own calculations

Figure A1: Excess profits and missing profits in bn. EUR, based on ETR, 2011-2015



Source: MiDi, JANIS, Janský (2019), García-Bernardo et al. (2020), own calculations

Figure A2: Excess profits and missing profits in % of gross profits, based on ETR, 2011-2015



Source: MiDi, JANIS, Janský (2019), García-Bernardo et al. (2020), own calculations

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