TRADE-OFFS OF MNE SUBSIDIARIES' ENGAGEMENT IN PROFIT SHIFTING

Milena Sitkiewicz, Faculty of Economic Science, University of Warsaw, Poland,
(m.sitkiewicz4@uw.edu.pl), ORCID: 0000-0002-5159-1133

Anna Białek-Jaworska, Faculty of Economic Science, University of Warsaw
(abialek@wne.uw.edu.pl) Ministry of Finance, Department of Tax Analysis, Poland, ORCID: 0000-0003-4520-8916

ABSTRACT
This paper aims to identify the determinants, effects and trade-offs of different channels of profit-shifting from Poland. On the one hand, tax avoidance adds to the loss of fiscal revenues, while on the other hand – debt-based and equity-based FDI inflows can support firm and industry growth and dividends or interest paid are capital costs. We contribute by exploring a quasi-experimental setting due to the changes in Poland's withholding tax and ATAD regulations. On a macro level, we use a Knowledge-Capital theoretical model and the Difference-in-Differences estimating by panel data estimators, while on a micro-level, we apply Tobit and panel data approach to administrative tax data on passive income payments to 110,907 non-residents from 134 countries, which are made up of 40,000 residents. This unique panel data set allows for in-depth analysis of payers' performance, free cash flow, capex, firm (industry) growth, leverage and debt capacity thanks to merging it with financial and ownership data retrieved from the Orbis database. We prove tightened WHT regulations have reduced passive flows from manufacturers to recipients addressed in these tax instruments. This happens thanks to substituting restricted transfer channels with asset management fees. However, separately transferred interests or royalties increased. On the contrary, services have reduced passive flows due to dividends, interest and royalties to countries that introduced ATAD CFC model A or B in 2018-2019 compared to other EU member states. Although services lose more on performance than manufacturing due to profit-shifting, there are trade-offs as foreign equity injections add to their growth.

Keywords: profit shifting, WHT, ATAD, tax havens, foreign capital, performance

1. INTRODUCTION

This research aims to identify the determinants, effects and trade-offs of different channels of profit-shifting from Poland. On the one hand, tax avoidance adds to the loss of fiscal revenues, while on the other hand – debt-based and equity-based FDI inflows can support firm and industry growth (Tørsløv et al., 2020; Igan et al., 2020) and then dividends or interests paid should be treated only as a cost of capital. So far, literature has focused on determinants, channels and scale of profit shifting to countries with harmful tax competition. Thus, we aim to contribute by assessing the trade-offs of MNE subsidiaries' engagement in profit-shifting, benefiting from a quasi-experimental setting due to the changes in Poland's withholding tax and anti-tax avoidance directive ATAD for controlled foreign company regulations. On the

macro-level, we apply the Knowledge-Capital theoretical framework and a Difference-in-Differences (DiD) using random-effects, fixed-effects or tobit panel data approach to assess these regulatory efficiencies. On a micro-level, we exploit tobit, fixed effects (FE) and a two-stage Arellano-Bond General Methods of Moments (GMM) and Arellano-Bover/Blundell-Bond system GMM estimators for dynamic panel data analysis (Blundell & Bond, 1998) to evaluate the effects and externalities of engagement in profit-shifting activities.

We explore administrative tax data on passive income payments to 110,907 non-residents from 134 countries made by 40,000 residents. This unique panel data set allows for in-depth analysis of payers' and recipients' characteristics thanks to merging it with financial and ownership data retrieved from the Orbis database.

Although many studies on the determinants, channels, and scale of profits shifting to countries that apply harmful tax competition, the profit-shifting effects on payers' growth, access to capital, and investments are also understudied. In the era of global minimal tax discussion, there is a lack of research on the impact of the WHT in host countries (set on passive income transferred to non-residents) on FDI and passive flows other than dividends, interests and royalties, i.e., assets management fees. In addition, most studies focus on U.S. companies. Hence, studying Polish passive income payers to non-residents (WHT taxpayers) may provide valuable insights for other European countries. Value is added by using unique tax (administrative) data of Polish payers of passive income to non-residents (IFT-2R), covering the total population and separating each transaction at the firm level by distinguishing both parties of the transactions. This paper contributes vital implications for policymakers who make economic decisions that influence trade-offs between FDI flows to boost industry growth and withhold taxation to limit profit-shifting via passive flows to non-residents, mainly outside the EU.

Furthermore, this study investigates how foreign capital (for which passive income transfers represent compensation or cost of capital in the form of equity, debt, or intellectual capital) impacts the growth (rate of revenue growth, rate of assets growth) and profitability (return on sales ROS, return on assets ROA) of payers making passive income payments to non-residents. Using firm-level data for Polish companies retrieved from the Orbis database, including financial statements, allows for checking the effects of Polish firms' (subsidiaries of MNEs compared to nonaffiliated that pay to third parties or other domestic nonpayers of passive income abroad) engagement in profit-shifting via passive flows. Moreover, this research explores how much free cash flow the passive income payers' could allocate to investments fell, how much their tangible and intangible capital expenditures dropped, whether their leverage surpasses the leverage of nonpayers and how profit-shifting affects debt capacity of passive income payers compared to nonpayers. This way, our study builds original and unique value added to existing knowledge on profit-shifting mechanisms, outcomes and externalities.

We provide robust evidence that tightened WHT regulations have reduced passive flows from manufacturers to recipients addressed in these tax instruments. This happens thanks to substituting restricted transfer channels with asset management fees, contrary to the services sector. However, separately transferred interests or royalties increased even in manufacturing sectors. On the contrary, service providers have reduced passive flows due to dividends, interest and royalties to countries that introduced ATAD CFC model A or B in 2018-2019 compared to

other EU member states. Although services lose more on performance than manufacturing due to profit-shifting, there are trade-offs as foreign equity injections add to their growth.

The remainder of the paper is structured as follows. Section 2 presents a literature review on profit shifting, motivation and direction. Section 3 provides the research description and formulates research hypotheses and questions. Section 4 describes the data and research methodology, and Section 5 presents the empirical results and their interpretation. The last section provides a summary and discussion of the results obtained.

2. LITERATURE REVIEW

"Profit shifting" refers to cross-border tax avoidance by multinational enterprises (MNEs), mainly through the use of **related-party debt**, **intangibles** (royalties and intangible services fees) and **transfer pricing** (Dharmapala, 2014; Dyreng et al., 2017; Gumpert et al., 2016; Elemes et al., 2021; Blaylock & Spence, 2021, Friedrich & Tepperova, 2021, Kaur & Kar, 2021, Khan & Krever, 2021). The former makes the profit-shifting independent of the payer's financial situation (profitability, risk of default) and the shareholders' meeting decision concerning the profit distribution after the fiscal year. Additionally, the interest-paid treatment as tax-deductible costs reduces tax liability. Firms influence the international allocation of accounting profits through their capital structure. Indeed, they can borrow intra-group and shift debt to high-tax jurisdictions to maximise tax deductions for interest payments, thereby reducing their worldwide tax payments (Mintz & Smart, 2004; Hines & Hubbard, 1990; Collins & Shackelford, 1992; Froot & Hines, 1992, Grubert, 1998, Goerdt & Eggert, 2022). Thus, debt financing becomes more attractive than equity because of the additional financial benefits of reduced income tax. Dischinger and Riedel (2011) show that MNEs prefer to locate intangible assets in low-tax countries, possibly because they can choose favourable transfer prices. Bilicka and Scur (2021) highlight the importance of proper management and tax deductions' optimisation skills on profit shifting because the government taxes final taxable income (profits) rather than productivity. The relationship between better governance and potentially lower corporate tax revenues has cost-benefit implications. Following Bloom et al. (2013), better management via more tractable and predictable production enables firms to carry out effective tax planning and thus shift a larger share of profits to maximise their after-tax profits. From a macroeconomic perspective, their results suggest that heterogeneity in firm management quality may mediate the effectiveness of corporate tax cuts and should be considered when designing such policies. Tax optimisation through the use of countries with competitive tax jurisdictions has become a standard business strategy for multinationals from both developed and emerging markets (Beugelsdijk et al., 2010; Chari & Acikgoz, 2016; Jones & Temouri, 2016; Jones et al., 2018; Pereira et al., 2019; Kemme et al., 2020). In addition, Tørsløv et al. (2020) indicate that nearly 40% of MNEs' profits are transferred to tax havens annually, and according to estimates by Cobham et al. (2015), losses in global tax revenues from profit shifting could be as high as $130 billion annually. As part of the Gospostrateg-VI/0029/202-00 project entitled "*The monitoring of innovation performance of firms and regulatory impact assessment: developing tools to support economic policy*", co-financed by the National Centre for Research and Development, our replication study for Poland based on Bilicka's (2019) approach shows that 33% of MNE subsidiaries' profits are transferred abroad, causing a loss of

6,4% in fiscal revenues due to corporate income tax in 2011-2021. However, preliminary calculations based on administrative data on passive flows indicate that profit-shifting accounts for 5.6% of income and 6.6% of tax expenses. By 2016, more than twice as many payments were made to other countries than to tax havens, and by 2021, the latter saw a 44% increase.

On a macro level, Sitkiewicz and Białek-Jaworska (2024), using a Knowledge-Capital theoretical model and Generalised Method of Moments (GMM) for dynamic panel data analysis and the difference-in-differences method, show that the amendment to WHT legislation reduced profit-shifting from manufacturing and service sectors, through interest, royalties and intangible services fees. The tax system tightening against aggressive tax competition has reduced passive income transfers from service companies contrary to manufacturing firms, which make higher transfers to tax havens included in both Polish and the EU list of countries applying harmful tax competition. However, their analysis covers the period from 2012 to 2019. We suppose these significant differences in sensitivity to tightened regulations are due to the structure of the assets held, i.e., tangibility, in the services compared to manufacturing sectors. In the manufacturing sector, where tangible fixed assets (machinery, equipment, factories, warehouses and land) predominate due to the difficulties of changing their geographical location, we expect a lower profit-shifting than the services. Because of the predominance of human capital and intangible assets in the service sector, flexibility is allowed when choosing and changing a location. Thus, we expect the following.

H1: *The tightened WHT (ATAD) regulation has reduced passive flows paid by payers from the services sector to recipients addressed in these tax instruments.*

On the contrary, such regulations should have less significant or even no effects in the manufacturing sectors. So we suppose that:

H2 *The tightened WHT (ATAD) regulation has not reduced passive flows paid by payers from the manufacturing sector to recipients addressed in these tax instruments.*

Because service providers are more engaged in tax optimisation strategies, they are expected to lose more due to profits shifting abroad. Therefore, we assume that:

H3 *Due to profit-shifting, service firms lose more on performance than manufacturing firms.*

We expect in H4 that following WHT tax regulation amendments, payers will adjust by substituting channels of transfers, i.e. replacing dividends, royalties or interest payments with assets management fees to avoid WHT taxation.

H4 *Following WHT tax regulation amendments, payers will adjust by substituting channels of transfers*.

The cause of that may be that the amended corporate income tax (CIT) act also introduces the "pay and refund" (P&R) mechanism regarding interests, dividends and royalties payments exceeding PLN 2 million transferred to one related entity, a foreign tax resident. Consequently, if the PLN 2 million thresholds are exceeded concerning the payments made to the same taxpayer (non-resident), the Polish entity is obliged to withhold the WHT at the standard rate (20 or 19%). Consequently, it cannot benefit from the WHT exemption or a reduced WHT rate under the relevant double tax treaties (Art. 26(2e) of the CIT Act). In

addition, the shifted profits tax introduced will apply if a payment is made directly or indirectly to a related party whose tax paid is 25% less than the hypothetical tax due if the 19% standard rate were applied. Additional conditions must also be met regarding the recipient's allocation or treatment of the payments received for tax purposes.

3. RESEARCH DESIGN

We analyse profits shifting to countries applying harmful tax competition and others, taking into account the split of the sample into manufacturing and service sectors. It allows for checking whether the determinants of profit shifting differ according to the flexibility of changing the geographical location of group members or types of channels in response to changes in tax regulations.

Our research examines the determinants of different channels of passive flows (i.e., dividends) and profit shifting carried out on the tax data of Polish payers of passive income to non-residents, with especially focusing on the effects of regulations introduced to reduce tax base erosion (BEPS), i.e. the 2018 and 2019 implementation of the Anti Tax Avoidance Directive (ATAD) for Controlled Foreign Companies (CFC) and the tightening of withholding tax (WHT) regulations since 2018. It utilises data from IFT-2R returns on WHT for 2012-2022. Passive flows include seven components: dividends, interests, royalties, intangible services (that constitute profit-shifting), airline & marine transport, and entertainment services.

The administrative IFT-2R data allows the application of macro (country-level) and micro (firm-level) data analysis approaches for payers (domestic entities, including MNE subsidiaries and individual entities acting outside the business groups) and recipients (MNEs).

In the **macro-level approach**, the aggregated total WHT taxed and non-taxed passive flows reported in the IFT-2R return and their separate components of profit shifting scaled by payers' taxable revenues (or – alternatively – scaled by tax-deductible costs) are dependent variables in different DiD models. The model specification derives from the *Knowledge-Capital Model*, controlling for market size, country's similarities, differentials in production factors, geographical distance, and institutional factors measured by Kaufmann's quality of governance indicators (Sebele-Mpofu et al., 2022). In models for analysing separate channels, we use specific control variables, particularly debt-based inward FDI, which is used as a control variable in models for interest payments scaled by taxable revenues, while in models for royalties – intangibles and the number of patent applications in recipients' destinations. It is needed to control economic fundaments for capital (and passive income) flows between countries. The primary test variables are dummy variables indicating the implementation of the ATAD directive to prevent tax avoidance practices (since 2016) and the WHT regulation amendment since 2018, mainly affecting transfers outside the EU. Finally, the last test variable is a *tax haven* dummy, indicating countries with harmful tax competition listed by the Minister of Finance (Ordinance 2005) and a wider list that includes EU members (Petutschnig et al., 2021). In addition, we control for variables used by, e.g., Gumpert et al. (2016), Bialek-Jaworska & Klapkiv (2021), and Fatica & Gregori (2020). We apply a propensity score matching approach to build a control group to a treated group of payers to identify the nearest neighbours. This allows for the construction of a panel database for both groups.

In the **micro-level approach**, we merge administrative data with financial and ownership data retrieved from the Orbis database. As dependent variables, we consider the profitability (i.e., return on sales ROS, return on assets ROA) and its changes due to engagement in profit-shifting, investment (capex), firm growth and industry growth measured by the sales (assets) growth rate, free cash flows, leverage and debt capacity. This stage of the research focuses on the impact of foreign capital (for which passive income represents compensation or a cost of capital) on the growth (rate of revenue growth, rate of assets growth) and profitability (return on sales ROS, return on assets ROA) of payers making passive income payments to non-residents. We distinguish nonrefundable equity, interest-bearing debt funds or intellectual (intangible or human) capital. We use firm-level data for Polish companies retrieved from the Orbis database, including financial statements and ownership structure, to check the effects of Polish firms' (subsidiaries of MNEs and individual entities acting outside business groups) engagement in profit-shifting via passive flows.

First, we check **[Q1]** how much their profitability (based on a rate of return on sales ROS or return on assets ROA) changed after shifting profits to non-residents. For this purpose, we measure the difference between ROS (ROA) in the following *t* and *t-1* years. Next, we estimate how this change in profitability is affected by separate channels of profit-shifting scaled by total assets (turnover) using the panel data fixed effects estimator.

Second, we test **[Q2]** how much free cash flow they could allocate to investments fell due to shifting profits abroad depending on different channels and indirectly due to varying capital injections, including equity, debt, intellectual – intangible or strategic advisory. We utilise the fixed effects panel data model for this purpose.

Third, we investigate **[Q3]** how much capital expenditures dropped as a consequence of profit-shifting through various channels of using the Tobit panel model for positive changes in the sum of depreciation and amortisation and a differential between tangible and intangible assets in the two following years.

Fourth, we examine **[Q4]** whether equity-based and debt-based FDI (for which passive income is paid) added to firm growth (measured by a rate of revenue growth or a rate of assets growth) compared to domestic companies without foreign equity injections that did not transfer earnings to non-residents. We apply the fixed effects panel data approach and Arellano–Bond GMM estimator for dynamic panel data analysis, controlling for foreign shareholders. We also consider industry growth for the total population and separate service and manufacturing industries using System GMM estimators. We inspect which capital (equity, debt, intellectual – intangible or strategic advisory) adds to the firm or industry's growth. We verify the hypothesis of whether profit-shifting definitely limits growth or whether there is evidence of stimulating growth by foreign capital injections.

Fifth, we inspect **[Q5]** whether passive income payers' leverage surpasses the leverage of nonpayers, utilising the t-Student test and panel Tobit model uncensored, right-censored upper 0.01 and left-censored lower than 0.015, controlling for foreign shareholders and payments to non-residents.

Finally, we scrutinise **[Q6]** how profit-shifting affects the debt capacity of passive income payers compared to nonpayers, controlling for foreign equity, using the fixed effects panel model approach. Because Altman et al. (2017) confirm the Z''-score model validity for Polish firms, our choice of Altman's Z''-score discriminant function for emerging markets

(Altman & Rijken, 2004) is justified. Thus, we calculate credit rating based on the Z''-score proposed by Altman and Rijken (2004) for emerging markets as

$$Z'' - score = 3.25 + 6.56\frac{WC}{TA} + 3.26\frac{RE}{TA} + 6.72\frac{EBIT}{TA} + 1.05\,BVETD \qquad (1)$$

where WC - working capital, TA - total assets, RE - retained earnings, EBIT - earnings before interests and tax, and BVETD - book value of equity / total long-term debt. If the *Z''*-score>8.15, the rating equals AAA; for *Z''*-score>7, the rating is AA; when *Z''*-score>6.4, the rating is A; if *Z''*-score>4.5, the rating is B+; if *Z''*-score>4.15, the rating is B; if *Z''*-score>2.5, the rating is CCC; and if *Z''*-score<2.5, the rating is D.

Debt capacity is the maximum amount a firm can borrow, incur and repay. Therefore, it reflects financial flexibility and liquidity in servicing actual and potential debt. Debt capacity is the value for debt ratio that results in a probability of p per cent of receiving a speculative rating (B, CCC or D in the seven-point rating scale (from AAA to D) (Fliers 2019; De Jong, Verbeek, and Verwijmeren 2012). From the perspective of financial flexibility, a firm reserves its debt capacity to fund future investment opportunities or limit the under-investment problem associated with a high debt ratio. We estimate a firm's debt capacity by determining the expected value of rating y^*_i based on firm characteristics, current rating, and debt ratio and by comparing this with the threshold $\gamma 3$, as follows:

$$dc\_e_{p,i} = \frac{\gamma_3 - x_i'\alpha_2 + \lambda_i - F^{-1}(p)}{\alpha_1} \qquad (2)$$

where γ_3 represents the frontier of high default risk when the firm loses a 'safe' rating of at least B+. We assume that ϵ_{it} follows an F-distribution with $F^{-1}(.)$ as its inverse. Next, we estimate a firm's credit rating y_i as follows:

$$y_{it}^* = \alpha_1 dr_{it} + x_{it}'\alpha_2 + \epsilon_{it} \qquad (3)$$

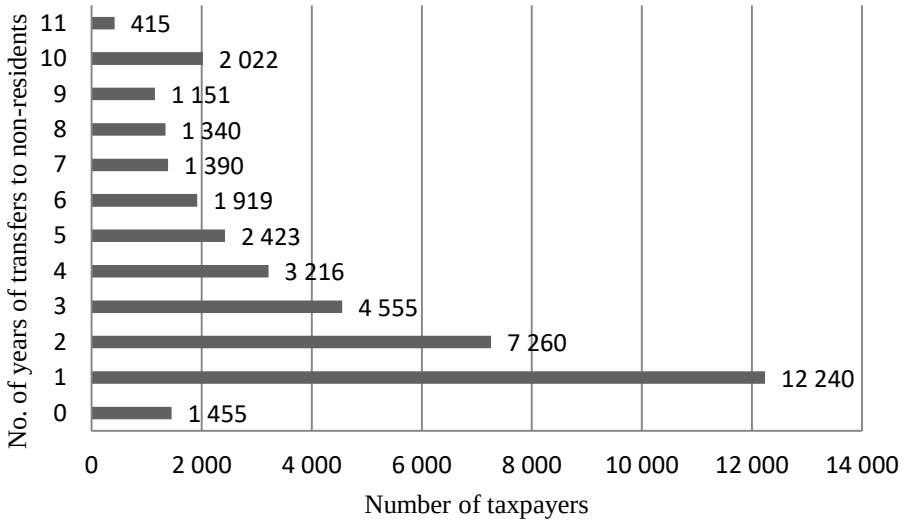
where y*i is the latent variable, xi is a set of firm characteristics, including total assets, sales, and equity to long-term debt ratio (BVETD), EBIT ratio, retained earnings, working capital, and dr_i is the long-term debt to assets ratio. We use a seven-point rating scale (AAA, AA, A, B+, B, CCC and D) following Ashbaugh-Skaife, Collins, and LaFond (2006). The ordinal logit model provides the boundaries (γ) between the different credit ratings. For example, an investment rating corresponds to a point where $y_i \geq 4$ and $y^*i = \gamma_3$. Finally, we calculate how much a firm can borrow until it reaches a high default risk and loses an unspeculative 'safe' rating (at least B+). At this point, the debt costs become high and then increase rapidly. Based on Fliers' (2019) work, we assume that p=0.2.

4. DATA SOURCES AND VARIABLE DEFINITIONS

The research sample covers data on beneficiaries from 134 countries that receive passive income transferred by over 40,000 Polish taxpayers (legal entities) and ca. 30,000 individuals (with no financial reports) who paid the WHT on this passive income and reported in the IFT-2R returns in 2012-2022. The number of payments made to non-residents has steadily increased, as Fig. 1 shows. Out of the 40,000 Polish taxpayers (legal entities), only 415 made the transfer in each of the following eleven years analysed; 12,240 did so only once between

2012 and 2022, and 1,455 corrected the submitted IFT-2R tax form to negative numbers and therefore are counted as payers of zero payments. Detailed statistics on the number of passive income transfers made abroad are shown in Figure 1. Nevertheless, the total amount of passive income transferred abroad has declined since 2017 (see Table 1).

Figure 1 **Annual passive income flows frequency in 2012-2022**



Source: Own elaboration based on IFT-2R returns using Stata/IC 16.0 software.

The largest transfers occurred between 2013 and 2015 - an average of PLN 52.6 million. Table 1 shows descriptive statistics of the profit-shifting variable defined as the sum of passive flows made to non-residents for each year from 2012 to 2022. Based on these, it can be observed that the mean transfer volume has begun to decline consistently since 2017, likely due to the introduction of the General Anti-Tax Avoidance Clause in mid-2016 and the tightening of withholding tax regulations since 2018.

Table 1 **Descriptive statistics of the *profit shifting* variable**

Year	N	Mean	Sts. Dev.	Min	Max
2012	7 825	6 787 055	115 000 000	0	7 890 000 000
2013	8 526	56 600 000	780 000 000	0	48 900 000 000
2014	10 612	58 800 000	1 110 000 000	0	72 300 000 000
2015	10 175	42 400 000	655 000 000	0	42 000 000 000
2016	13 002	32 700 000	429 000 000	0	30 000 000 000
2017	14 949	23 300 000	283 000 000	0	25 600 000 000
2018	16 832	17 300 000	194 000 000	0	18 700 000 000
2019	18 474	11 600 000	138 000 000	0	14 700 000 000
2020	19 908	5 375 542	58 100 000	0	4 120 000 000
2021	18 157	2 641 331	37 800 000	0	2 970 000 000
2022	34 070	309 868	7 970 590	0	870 000 000

Source: Own elaboration based on IFT-2R returns using Stata/IC 16.0 software.

In the macro-level approach, using the Knowledge-Capital model specification controlling for market size, country's similarities, differentials in production factors, and geographical distance, we consider the impact of the tightened WHT regulation on passive flows for the

entire sample and also for manufacturing and services sector separately. The dependent variable (*PSWHT_revenue*) is the aggregated total taxed and non-taxed passive flows for dividends, interests and license payments. Table 2 presents the definitions of all variables used.

The baseline model to be estimated in the macro-level approach has the following form:

$$PSWHT\_revenue_{it} = \beta_0 treated_{it} + \beta_1 regWHT_{it} + \beta_2 DID_{it} + \beta_3 sdij_{it} + \beta_4 ln\_kdiff_{it} + \beta_5 hdiff_{it} + \beta_6 sum_{it} + \beta_7 \ln\_distance_{it} + \beta_8 tangibility_{it} + \beta_9 intangibility_{it} + \beta_{10} human\_capital_{it} + \beta_{11} debt\_FDI_{it} + \beta_{12} patent_{it} + Controls + u_{it}$$

where: index *i* denotes the unit of study 1.2...,
index *t* represents the following years from 2012 to 2021 (2012,...,2021),
controls state for Kaufmann world governance indicators of governance quality: *voice_and_accountability, control_of_corruption, rule_of_law, regulatory_quality, political_stability, government_effectiveness*.

In the micro-level approach, using merged administrative data with financial and ownership data retrieved from the Orbis database for the 2012-2022 years, we consider the changes in taxpayers' profitability (i.e., return on sales ROS, return on assets ROA) due to profit shifting to non-residents. For this purpose, defined dependent and control variables will be used in individual estimations. The baseline model to be estimated has the following form:

$$y_{it} = \beta_1 \ln\_PS\_channel\_s_{it} + Controls + u_{it}$$

$$y_{it} = \beta_1 \ln\_PS\_channel\_a_{it} + Controls + u_{it}$$

where: y – dependent variable: *ROS, ROA, FCFF, CAPEX, growth_S, growth_A, leverage* or debt capacity;
index *i* denotes the units of study 1, 2, ...,
index *t* represents the following years from 2012 to 2022 (2012,...,2022).

Table 2 **Definitions of variables**

Definitions of variables for macro-level approach			
Variable	**Definition**	**Sign**	**Source**
Dependent variables			
PSWHT_revenue PSATAD_revenue	$\ln(1 + \frac{\text{dividends + interest + royalties)}}{\text{taxable revenue}}$		
PSWHT_costs PSATAD_costs	$\ln(1 + \frac{\text{dividends + interest + royalties)}}{\text{taxable costs}}$		
Test variables			
regWHT	WHT regulatory amendment in October 2018 was preceded by the introduction of the anti-avoidance clause in 2017. A dummy variable takes the value 1 for 2018-2019 and 0 otherwise	-	
tax_haven	A binary variable taking the value of 1 for countries classified as tax havens under the Polish Minister of Finance Regulation (2005)	+	European Commission
Control variables			

sdi_{ij}	Helpman's size dispersion index is calculated using data on output-side real GDP at chained purchasing power parity (PPP) rates and expressed in constant 2011 U.S. dollars for a paired host and home (origin) countries. $$sdi_{ij} = 1 - gdp_{i\,sum}{}^2 - gdp_{j\,sum}{}^2$$		Penn World Table 10.0 www.ggdc.net/pwt
ln_kdiff	the logarithm of capital per worker difference calculated using the national capital stocks expressed in PPPs in constant 2011 USD and the number of workers employed		Penn World Table 10.0 www.ggdc.net/pwt
hdiff	the logarithm of the differences in human capital endowments calculated using the human capital indexes for the source and host countries that are based on the average years of schooling and return to education		Penn World Table 10.0 www.ggdc.net/pwt
sum	the combined market size in origin and host countries measured by the logarithm of the sum of GDP of partner countries at purchaser's prices; GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the product's value. It is calculated without deductions for the depreciation of fabricated assets or depletion of natural resources. Data are in current U.S. dollars. GDP dollar figures are converted from domestic currencies using single-year official exchange rates.	+	Penn World Table 10.0 www.ggdc.net/pwt
distance	distance between Warsaw (the capital city of Poland) and the capital city of a beneficiary country	-	www.indo.com/distance
Kaufmann indexes			
voice_and_ accountability	voting rights and accountability capture perceptions of the extent to which a country's citizens can participate in selecting their government, freedom of expression, freedom of association, and a free media	-	
control_of_corruption	control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption and "capture" of the state by elites and private interests	-	
rule_of_law	the rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular, the quality of contract enforcement, property rights, the police, and the courts, the likelihood of crime and violence	-	Worldwide Governance Indicators www.govindicators.org
regulatory_quality	regulatory quality captures perceptions of the government's ability to formulate and implement sound policies and regulations that permit and promote private-sector development	-	
political_stability	political stability and absence of violence/terrorism measure perceptions of the likelihood of political instability and politically motivated violence, including terrorism	-	

government_ effectiveness	effectiveness of state authorities captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	-	
patent	worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention–a product or process–that provides a new way of doing something or offers a new technical solution to a problem (a patent protects the invention to the owner of the patent for a limited period, generally 20 years)		World Development Indicators
tangibility	$\frac{\text{tangible assets}}{\text{total assets}}$	-	
intangibility	$\frac{\text{intangible assets}}{\text{total assets}}$	+	
human_capital	a binary variable taking the value of one if the number of employees>0 and 0 otherwise	-	
debt_FDI	$\frac{total\ FDI\ inflow}{\text{net FDI equity inflow}}$	+	

Definitions of variables for micro-level approach

Variable	Definition
Dependent variables	
ROS	$\frac{\text{profit before tax}}{\text{operating turnover}}$
ROA	$\frac{\text{profit before tax}}{\text{total assets}}$
FCFF	$(1 - \text{tax rate}) \times \text{EBIT} + \text{depreciation \& amortisation} - \text{CAPEX} - \text{working capital}$, taking into account 19% as the main corporate income tax (CIT) rate
CAPEX	(tangible assets$_t$ - tangible assets$_{t-1}$) + (intangible assets$_t$ - intangible assets$_{t-1}$) + depreciation & amortisation
growth_S	$\frac{\text{operating turnover}_t}{\text{operating turnover}_{t-1}}$
growth_A	$\frac{\text{total assets}_t}{\text{total assets}_{t-1}}$
leverage	$\frac{(\text{long term debt} + \text{short term debt})}{\text{total assets}}$
Control variables	
ln_PS_channel_s	$\ln(1+\frac{\text{profit shifting}}{\text{operating turnover}})$, where profit shifting is a sum of taxable and non-taxable payments for each channel, i.e. transport, airlines, dividend, interests, license, show, consulting, Art. 21 & 22 of the CIT Act and equity
ln_PS_channel_a	$\ln(1+\frac{\text{profit shifting}}{\text{total assets}})$, where profit shifting is a sum of taxable and non-taxable payments for each channel, i.e. transport, airlines, dividend, interests, license, show, consulting, Art. 21 & 22 of the CIT Act and equity

foreign_shareholder	a binary variable taking the value of one if a firm has at least one foreign shareholder and 0 otherwise
payer	a binary variable taking the value of one if a firm has at least one transfer passive income to a non-resident and 0 otherwise

Source: Own elaboration based on Orbis database using Stata/IC 16.0 software

4.1. Statistical analysis of variables

Table 3 shows the descriptive statistics of continuous variables such as mean, standard deviation, and minimum and maximum values.

Table 3 **Descriptive statistics of continuous variables**

	Obs	Mean	Std.Dev.	Min	Max
distance	198,242	2232.504	2717.706	393	17695
sdi	332,508	0.32034	0.13687	0.000259	0.49999
ln_kdiff	322,021	12.548	0.60856	0	13.59863
hdiff	332,508	0.70103	2.11452	-0.215118	26.29449
sum	202,926	14.9327	0.87283	13.79401	16.89777
voice_and_accountability	233,969	1.04402	0.60222	-2.25	1.74
control_of_corruption	233,991	1.21809	0.81156	-1.79511	2.41
rule_of_law	233,991	1.26853	0.70221	-2.28685	2.13
regulatory_quality	233,991	1.23017	0.66558	-2.27972	2.26
political_stability	233,993	0.59801	0.50964	-2.72717	1.64433
government_effectiveness	233,991	1.23509	0.65854	-2.2187	2.28457
patent	355,183	43514.58	97925.2	1	336340
tangibility	368,753	0.41306	63.9064	-0.094968	29283.29
intangibility	368,753	0.03314	0.102741	-0.009297	0.99254
human_capital	368,753	0.73719	0.440156	0	1
debt_FDI	368,753	2711.416	4481.901	-8879.4	22163.1
ROS	140,798	0.01568	0.310713	-1	0.9369
ROA	144,202	0.04006	0.41616	-2.5	1.081
ln_FCFF	68,808	3.03677	14.5342	-24.9566	22.60149
ln_CAPEX	70,950	10.1668	6.28913	0	25.11739
growth_S (firm level)	1,024,657	1.4532	1.6085	0.0698	10
growth_A (firm level)	1,087,936	1.4243	1.4540	0.24	10
leverage	2,900,324	0.0294	0.1255	0	1
dc (debt capacity)	1,077,494	-1.7035	9.2901	-1132.837	1031.851

Source: based on IFT-2R, Penn Table 10.0, WGI, Heritage Foundation, Orbis Database using Stata/IC 16.0.

The model also used three dummy test variables: *regWHT*, *tax_haven* and *human_capital*, defined in Table 1. A statistical summary of these variables is shown in Table 4.

Table 4 **Descriptive statistics of dummy variables**

Variable		Freq.	Per cent	Cum.
regWHT	0	235,691	63.92	63.92
	1	133,062	36.08	100.00
	Total	368,753	100.00	
tax_haven	0	330,109	89.52	89.52
	1	38,644	10.1948	100.00
	Total	368,753	100.00	
human_capital	0	96,909	26.28	26.28
	1	271,844	73.72	100.00
	Total	368,753	100.00	
foreign_shareholder	0	190,328	51.61	51.61
	1	178,425	48.39	100.00
	Total	368,753	100.00	

Source: Own elaboration based on IFT-2R returns using Stata/IC 16.0 software.

In addition, the entire sample is split into subsamples of manufacturing and services payers of passive flows to non-residents to verify whether the magnitude of profit shifting varies depending on the flexibility to change the location of group members (factories or service providers) in response to changes in tax regulations. Given the relatively "rigid" (difficult to alter) area of the manufacturing industry infrastructure, we expect more vital linkage to tax havens to occur in the service industry. This is directly related to the predominant type of capital available to both sectors: physical (fixed assets) and human. However, unlike tangible assets, such as warehouses and production halls, the services sector relies more on the ownership of intangible assets, allowing relocation flexibility. Table 5 presents a summary of the sample breakdown by industry.

Table 5 **Descriptive statistics of the variable *sector***

sector	Freq.	Per cent	Cum.
Manufacturing	129,095	35.01	35.01
Services	239,658	64.99	100.00
Total	368,753	100.00	

Source: Own elaboration based on IFT-2R returns and PKD code using Stata/IC 16.0 software.

4.2. Results for macro-level approach

Estimates on the macro-level approach allowed us to evaluate the impact of tightened withholding tax regulations introduced in 2018. (*reg_WHT*). The new rules apply to dividend, interest and license payments exceeding PLN 2 million transferred to one related entity, a foreign tax resident, so we estimate the DID (difference-in-differences) model, controlling for macroeconomic and institutional variables (in Tables 6-9), in which the dependent variable is *PSWHT* - profit shifting defined as taxed and nontax payments from the three channels affected by WHT regulation, i.e. dividend, interest and royalty payments scaled by payers' taxable revenues. The treated group consists of payments exceeding PLN 2 million to one non-resident yearly. The model specification derives from the *Knowledge-Capital Model*, controlling for market size, country's similarities, differentials in production factors, geographical distance, and institutional factors measured by Kaufmann's quality of governance indicators (Sebele-

Mpofu et al., 2022). The results obtained for the whole sample and manufacturing and services sector separately are presented in Tables 6-9.

Results show that the treated group made higher transfers and that larger amounts of passive income have been shifted since 2018. The negative estimate with the *DID* variable, shown in Table 6, indicates that profit-shifting from dividends, interest, and royalty fees has decreased since 2018 for the total sample and the manufacturing sector due to tighter withholding tax regulations. First, this does not allow verifying the H1 hypothesis because this coefficient estimate for the service sector is insignificant. Second, the significant results for the manufacturing industry lead us to reject the H2 hypothesis as manufacturers are sensitive to this amendment WHT regulation.

Coefficient estimates for variables from the Knowledge Capital model (*sdij*, *ln_kdiff*, hdiff, sum, distance) are significant, especially in models estimated for the entire sample and the service sector. This confirms that the Knowledge Capital theoretical model explains this phenomenon. A positive estimate of coefficients at the *sdi* variable means that horizontally integrated MNEs are more involved in profit shifting from Poland, and the market access motive plays more importance. A positive estimate of a coefficient at the *hdiff* variable points out that vertically integrated service MNEs are more likely to transfer earnings to non-residents. Negative coefficients at the *distance* variable indicate that trade costs matter in profit shifting. These suggest that higher passive flows go to closer economies, i.e. Germany. This is consistent with classical trade theory, indicating that transportation costs can significantly hinder trade in goods (*manufacturing sector*) and services. Because the coefficients at *hdiff* and *kdiff* variables are both positive, the efficiency-seeking motive is more important than the market access motive in explaining profit transfers abroad. From the service sector, more passive income is shifted to smaller countries. A positive parameter estimate at the *debt_FDI* variable indicates greater profit transfers from service sector payers when financed with foreign debt. Similarly, more profits are shifted to countries with more patents, i.e., via royalties paid by service companies. Higher passive income flows are made by payers characterised by more tangible assets in the service sector but with low tangibility in the manufacturing industry, fewer intangibles, and less labour-intensive. On the other hand, debt-based FDI and patents appear insignificant for profit shifting from the manufacturing sector. Fewer passive incomes are transferred to countries with better *control of corruption*, *regulatory quality*, and *political stability*. This implies that in addition to tightening WHT regulations and institutions related to controlling bribery at the national level, political stability and regulatory quality would reduce profit shifting contrary to better government effectiveness or the rule of law.

Table 6 **Macro-level results for profit shifting on introducing WHT regulation - RE**

variable	entire sample	entire sample with Kaufmann indexes	services	manufacturing
treated	0.3263***	0.3259***	0.3243***	0.3231***
	(0.0017)	(0.0017)	(0.0021)	(0.0031)
regWHT	0.0091***	0.0112***	0.0083***	0.0102**
	(0.0020)	(0.0021)	(0.0024)	(0.0037)
DID	-0.0337***	-0.0340***	0.0012	-0.0945***
	(0.0058)	(0.0058)	(0.0071)	(0.0099)
hdiff	0.0064***	0.0066***	0.0063***	0.0035**
	(0.0006)	(0.0006)	(0.0007)	(0.0013)
ln_kdiff	0.0061***	0.0027**	0.0076***	0.0012
	(0.0011)	(0.0013)	(0.0013)	(0.0018)
sdi	0.0726***	0.0683***	0.0762***	0.0419**
	(0.0105)	(0.0108)	(0.0124)	(0.0198)
sum	-0.0041**	-0.0057***	-0.0060***	0.0010
	(0.0016)	(0.0018)	(0.0019)	(0.0029)
distance_ln	-0.0074***	-0.0074***	-0.0089***	-0.0041**
	(0.0011)	(0.0012)	(0.0013)	(0.0021)
tangibility	0.0064**	0.0059**	0.0185***	-0.0073*
	(0.0025)	(0.0025)	(0.0033)	(0.0041)
intangibility	-0.0474***	-0.0481***	-0.0448***	-0.0551***
	(0.0059)	(0.0059)	(0.0071)	(0.0107)
human_capital	-0.0296***	-0.0293***	-0.0360***	-0.0085***
	(0.0011)	(0.0011)	(0.0014)	(0.0021)
debt_FDI	0.0000008***	0.00000097***	0.0000010***	0.0000002
	(0.0000001)	(0.00000015)	(0.0000001)	(0.0000002)
patent	0.00000008***	0.00000006***	0.00000009***	0.00000001
	(0.00000001)	(0.00000001)	(0.00000002)	(0.00000003)
Kaufmann indices:				
voice_and_accountability		0.0052		
		(0.0033)		
control_of_corruption		-0.0095***		
		(0.0032)		
rule_of_law		0.01757***		
		(0.0050)		
regulatory_quality		-0.0176***		
		(0.0036)		
political_stability		-0.0078***		
		(0.0018)		
government_effectiveness		0.0155***		
		(0.0048)		
_cons	0.0356	0.0937***	0.0586**	-0.0011
	(0.0245)	(0.0279)	(0.0296)	(0.0433)
Number of observations	173,012	173,012	122,211	46,713
Number of groups	112,872	112,872	80,791	28,940
Wald test	38817.01***	38883.61***	27193.98***	11608.42***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

In order to further analyse the impact of tightening WHT regulations, separate estimates were also made for each payment channel affected by the regulation, i.e. dividends, interest and royalties. The estimates obtained for the dividend channel (in Table 7) coincide with those for the total profit transfer shown in Table 6. However, tangibility does not matter when explaining dividends paid out by the service sector.

Table 7 **Macro-level effects of introducing WHT regulation for dividends - RE**

variable	entire sample	services	manufacturing
treated	0.1786***	0.1701***	0.1861***
	(0.0026)	(0.0030)	(0.0046)
regWHT	0.0079**	0.0100**	0.0033
	(0.0031)	(0.0036)	(0.0057)
DID	-0.0399***	-0.0040	-0.0872***
	(0.0089)	(0.0106)	(0.0156)
hdiff	0.0031***	0.0028***	-0.0007
	(0.0008)	(0.0009)	(0.0017)
ln_kdiff	0.0032**	0.0028	0.0026
	(0.0015)	(0.0018)	(0.0026)
sdi	0.0615***	0.0603***	0.0375
	(0.0152)	(0.0170)	(0.0289)
sum	-0.0047**	-0.0046*	-0.0058
	(0.0024)	(0.0027)	(0.0043)
distance_ln	-0.0078***	-0.0078***	-0.0074**
	(0.0016)	(0.0017)	(0.0031)
tangibility	-0.0127***	-0.0048	-0.0266***
	(0.0036)	(0.0046)	(0.0062)
intangibility	-0.0425***	-0.0381***	-0.0540***
	(0.0087)	(0.0101)	(0.0160)
human_capital	-0.0225***	-0.0237***	-0.0074**
	(0.0017)	(0.0020)	(0.0032)
debt_FDI	0.000001***	0.000001***	0.0000002
	(0.0000002)	(0.0000003)	(0.0000004)
patent	0.0000001***	0.0000001***	0.0000001
	(0.00000002)	(0.00000002)	(0.00000004)
_cons	0.0833**	0.0862**	0.10790*
	(0.0356)	(0.0409)	(0.0637)
N observations	173,012	122,211	46,713
Number of groups	112,872	80,791	28,940
Wald test	5435.97***	3814.13***	1765.06***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

In contrast, the estimates for the internal debt channel for profit shifting differ. A positive estimate of a coefficient at the *DID* variable for the total population and the services sector indicates that tightening withholding tax regulations is inefficient as it has not reduced profit shifting from this sector. This gives grounds for rejecting hypothesis H1 for interest. Conversely, changes in regulation were found to be insignificant in the interest payment channel for the manufacturing sector. This supports the H2 hypothesis.

Although tangibility is positively correlated with profits shifted by manufacturers, the variables from the Knowledge-Capital theoretical approach framework and debt-based FDI were insignificant for payers in the manufacturing sector. Positive estimates for the *distance* variable,

defined as the distance between Warsaw and the capital of the beneficiary country, are statistically significant in the services sector in opposition to manufacturing. This result suggests that higher interests go to more distant economies from the services sector, while the variable in the manufacturing sector is insignificant. This is contrary to classical trade theory, indicating that transportation costs are a significant barrier to trade. Therefore, the findings confirm that tax optimisation motivates passive flows more than trade since trade costs play no role.

Table 8 **Macro-level effects of introducing WHT regulation for interest - RE**

variable	entire sample	services	manufacturing
treated	0.0332***	0.0379***	0.0211***
	(0.0014)	(0.0017)	(0.0022)
regWHT	0.0071***	0.0076***	0.0056**
	(0.0016)	(0.0019)	(0.0025)
DID	0.0076*	0.0153**	-0.0052
	(0.0042)	(0.0053)	(0.0063)
hdiff	0.0041***	0.0041***	0.0016
	(0.0005)	(0.0006)	(0.0010)
ln_kdiff	0.0046***	0.0056*	0.0010
	(0.0009)	(0.0011)	(0.0016)
sdi	0.0191**	0.0203***	0.0049
	(0.0093)	(0.0110)	(0.0168)
sum	-0.0053***	-0.0076***	-0.00001
	(0.0014)	(0.0017)	(0.0024)
distance_ln	0.0024**	0.0028**	0.0008
	(0.0009)	(0.0011)	(0.0017)
tangibility	0.0109***	0.0135***	0.0108***
	(0.0020)	(0.0028)	(0.0031)
intangibility	-0.0150***	-0.0150**	-0.0129
	(0.0049)	(0.0060)	(0.0083)
human_capital	-0.0201***	-0.0240***	-0.0107***
	(0.0009)	(0.0011)	(0.0015)
debt_FDI	0.0000007***	0.0000009***	0.0000002
	(0.0000001)	(0.0000001)	(0.0000002)
patent	0.00000002*	0.00000004**	-0.00000001
	(0.00000001)	(0.00000001)	(0.00000003)
_cons	0.0130	0.0333	-0.0095
	(0.0213)	(0.0260)	(0.0361)
N observations	173,012	122,211	46,713
Number of groups	112,872	80,791	28,940
Wald test	1627.21***	1471.32***	163.19***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

The positive estimates of a parameter at the *DID* variable in models for the intangibles (royalty payment) channel indicate that the new withholding tax regulations are inefficient and have not reduced profit transfer overall or from the services sector. On the contrary, it boosts manufacturers' royalty payments to non-residents. This is a basis for rejecting hypothesis H2. However, a parameter estimate at the DID variable is insignificant for the services sector, making it impossible to analyse the impact of regulations on royalty payments in this sector. We have no basis to test H1.

Positive estimates for coefficients at the *intangibility* variable for the total sample and the services sector confirm that companies that own more intangible assets (including licenses, for example) make larger transfers. In contrast, for the manufacturing sector and the total sample, parameters estimate at the *tangibility* variable turned out to be significantly negative, which is also in line with expectations, implying that companies with a preponderance of fixed assets will be less likely to engage in profit transfers due to the reduced flexibility to change the location of their operations. However, more profits are shifted to larger economies (based on the estimates of parameters at the *sum* variable) by less labour-intensive service providers.

Table 9 **Macro-level effects of introducing WHT regulation for royalties – tobit**

variable	entire sample	services	manufacturing
treated	0.0064***	0.0062***	0.0069***
	(0.0002)	(0.0002)	(0.0003)
regWHT	0.0008***	0.0008***	0.0009**
	(0.0002)	(0.0002)	(0.0003)
DID	0.0010*	0.0004	0.0022**
	(0.0005)	(0.0006)	(0.0008)
hdiff	0.00003	-0.00003	0.0004***
	(0.00006)	(0.00007)	(0.0001)
ln_kdiff	0.00006	0.00016	-0.0001
	(0.0001)	(0.0001)	(0.0002)
sdi	0.00300**	0.00284**	0.00300
	(0.0011)	(0.0013)	(0.0021)
sum	0.0007***	0.0004**	0.00124***
	(0.0002)	(0.0002)	(0.0003)
distance_ln	-0.0001	-0.0001	0.0002
	(0.0001)	(0.0001)	(0.0002)
tangibility	-0.0009***	0.0001	-0.0030***
	(0.0002)	(0.0003)	(0.0004)
intangibility	0.0015**	0.0018**	-0.0004
	(0.0006)	(0.0007)	(0.0011)
human_capital	-0.0011***	-0.0014***	-0.0001
	(0.0001)	(0.0001)	(0.0002)
debt_FDI	0.000000004	0.00000001	-0.00000001
	(0.00000001)	(0.00000002)	(0.00000002)
patent	0.0000000001	0.000000001	-0.000000001
	(0.000000002)	(0.000000002)	(0.000000004)
_cons	-0.0086***	-0.0053*	-0.0160***
	(0.0026)	(0.0032)	(0.0045)
N observations	173,012	122,211	46,713
Number of groups	112,872	80,791	28,940
Wald test	1751.58***	1131.81***	751.59***
LR test p-value	0.0000	0.0000	0.0000

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Next, we focused on the DID approach (in Tables 10-11),

The amendment WHT rules apply to dividend, interest and license payments exceeding PLN 2 million transferred to one related entity, a foreign tax resident, so we estimate the DID (difference-in-differences) model, in which the dependent variable is *PSWHT* - profit shifting defined as a sum of all together taxed and nontax payments from the three channels affected by WHT regulation, i.e. dividend, interest and royalty payments scaled by payers' taxable revenues

in Table 10 (or – alternatively – scaled by tax-deductible costs in Table 11). Next, in response to hypothesis H4: *Following WHT tax regulation amendments, payers will adjust by substituting channels of transfers*, we add models (in Tables 10-11) with consulting payments as a hypothetical substitution channel (*treated_consulting_rev_wht = treated × PS_consulting_revenue × regWHT*).

A negative significant coefficient estimate at the *DID* variable (*treated×regWHT*) for the entire sample allows us to conclude that the tightened withholding tax regulation has reduced passive flows from dividends, interest and royalty fees since 2018, no matter whether payers' revenues or tax-deductible costs scale the dependent variable.

A significant positive coefficient of the *treated_consulting_rev/costs* variable estimate indicates that payers of dividends, interest or royalties transfer higher consulting fees to non-residents. However, the negative parameter estimate at the *treated_consulting_rev/costs_wht* variable means that as a result of implementing new WHT regulations, consulting payments are negatively correlated with a dependent variable, which is consistent with the H4 hypothesis that following WHT tax regulation amendments, payers adjusted by substituting channels of transfers. This means there is no basis for rejecting hypothesis H4.

Table 10 **DiD results for profit shifting on introducing WHT regulation, a total sample**

variable	PSWHT_ revenue	PSWHT_ revenue	PSWHT_ costs	PSWHT_ costs
treated	0.2196***	0.2082***	0.2287***	0.2168***
	(0.0025)	(0.0025)	(0.0024)	(0.0024)
regWHT	-0.0146***	-0.0141***	-0.0116***	-0.0110***
	(0.0028)	(0.0027)	(0.0027)	(0.0027)
DID	-0.0889***	-0.0793***	-0.0873***	-0.0798***
	(0.0054)	(0.0054)	(0.0052)	(0.0052)
treated_consulting_rev		2.7861***		
		(0.0799)		
treated_consulting_rev_ wht		-0.5661** (0.2622)		
treated_consulting_costs				2.8294***
				(0.0780)
treated_consulting_costs_ wht				-0.3809* (0.2376)
_cons	0.0210***	0.0211***	0.0188***	0.0189***
	(0.0006)	(0.0006)	(0.0005)	(0.0005)
Number of observations	199,037	199,037	199,015	199,015
Number of groups	101,211	101,211	101,184	101,184
F test	2621.58***	1839.27***	3002.56***	2097.63***
F test that all u_i=0	2.40***	2.40***	2.34***	2.33***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Table 11 **DiD results for profit shifting scaled by taxable revenue (tax-deductible costs) on introducing WHT regulation for services and manufacturing sectors**

	services		manufacturing	
variable	**PSWHT_ revenue**	**PSWHT_ revenue**	**PSWHT_ revenue**	**PSWHT_ revenue**
treated	0.2383***	0.2260***	0.2072***	0.1978***
	(0.0033)	(0.0033)	(0.0044)	(0.0045)
regWHT	-0.0217***	-0.0211***	-0.0088**	-0.0085*
	(0.0039)	(0.0038)	(0.0044)	(0.0044)
DID	-0.0790***	-0.0741***	-0.1012***	-0.0868***
	(0.0071)	(0.0071)	(0.0090)	(0.0092)
treated_consulting_rev		3.0355***		2.0032***
		(0.1070)		(0.1273)
treated_consulting_rev_wht		-0.2487		-1.6190***
		(0.2622)		(0.4831)
_cons	0.0213***	0.0217***	0.0172***	0.0172***
	(0.0007)	(0.0006)	(0.0009)	(0.0009)
Number of observations	128,901	128,901	70,136	70,136
Number of groups	67,948	67,948	39,917	39,917
F test	1833.38***	1281.26***	761.68***	510.52***
F test that all u_i=0	2.39***	2.39***	2.24***	2.23***
	services		**manufacturing**	
variable	**PSWHT_ costs**	**PSWHT_ costs**	**PSWHT_ costs**	**PSWHT_ costs**
treated	0.2472***	0.2346***	0.2176***	0.2078***
	(0.0031)	(0.0031)	(0.0044)	(0.0044)
regWHT	-0.0195***	-0.0189***	-0.0041	-0.0037
	(0.0037)	(0.0037)	(0.0044)	(0.0044)
DID	-0.0734***	-0.0707***	-0.1059***	-0.0944***
	(0.0068)	(0.0069)	(0.0090)	(0.0091)
treated_consulting_costs		20.9978***		2.0574***
		(0.1025)		(0.1322)
treated_consulting_costs_wht		-0.1503		-1.0030**
		(0.2904)		(0.4240)
_cons	0.0186***	0.0190***	0.0157***	0.0156***
	(0.0007)	(0.0007)	(0.0009)	(0.0009)
Number of observations	128,966	128,966	70,049	70,049
Number of groups	67,976	67,976	39,852	39,852
F test	2120.42***	1472.74***	841.49***	557.36***
F test that all u_i=0	2.36***	2.36***	2.10***	2.08***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

The estimates obtained separately for the service and manufacturing sectors are consistent with the results obtained for the entire sample. A negative significant estimate at the *DID* variable for services allows us to conclude that the tightened withholding tax regulation has reduced passive flows from dividends, interest and royalty services since 2018. The estimates for profit shifting scaled by tax costs confirm the results obtained. Thus, there is no basis to reject hypothesis H1 that the tightened WHT regulation has reduced passive flows paid by payers from the services sector to recipients addressed in these tax instruments.

For the manufacturing sector, a negative estimate was also obtained with the *DID* variable (*treated*×*regWHT*), indicating that the regulations introduced since 2018 have contributed to a

decline in passive income flows due to dividends, interest and royalties, which is therefore inconsistent with the H2 hypothesis that *the tightened WHT regulation has not reduced passive flows paid by payers from the manufacturing sector to recipients addressed in these tax instruments.*

The negative coefficient estimate at the *treated_consulting_rev/costs_wht* variable means that as a consequence of the implementation of the novel WHT regulations, consulting payments substituted the profit-shifting channel (the dependent variable) in the manufacturing sector, which aligns with the H4 hypothesis that payers adjusted to avoid taxation. In contrast, for the service sector, the parameter estimate at the *treated_consulting_rev/costs_wht* variable is insignificant, which does not allow us to verify hypothesis H4.

Next, we examine how introducing the Anti-Tax Avoidance Directive (ATAD) for Controlled Foreign Companies (CFC) in 2018-2019 impacts tax avoidance practices. We consider the countries that introduced model A or B of this CFC directive, listed in Table 12.

Table 12 **List of countries with regulations on Controlled Foreign Companies (CFCs)**

country	year of introduction
Austria	2018
Germany	2018
Ireland	2018
Romania	2018
Belgium	2019
Bulgaria	2019
Croatia	2019
Czech Republic	2019
Estonia	2019
Finland	2019
Greece	2019
Hungary	2019
Italy	2019
Latvia	2019
Lithuania	2019
Luxembourg	2019
Malta	2019
Netherlands	2019
Portugal	2019
Slovakia	2019
Slovenia	2019
Sweden	2019

Source: Own elaboration based on OECD data.

To verify hypotheses H1 and H2 concerning the impact of the implementation of the ATAD directive, as in the case of WHT regulation, we estimate the DID (difference-in-differences) model in which the dependent variable is *PSATAD* - profit shifting defined as taxed and nontax payments from the analysed channels (*dividends, interests and license*). The *treated_atad* group consist of the countries that introduced the Anti-Tax Avoidance Directive for Controlled Foreign Companies (CFC) in 2018 or 2019. The variable *atad_cfc_model* is a binary variable taking the value of one for a period from 2018 to 2022. Table 8 presents the Tobit regression results for the entire sample and manufacturing and services sector separately. Results of DiD

estimates give no basis for rejecting hypothesis H1. A negative significant estimate at the *DID* variable for the total sample and services allows us to conclude that the tightened ATAD CFC tax regulation has reduced passive flows from dividends, interest and royalties services since 2019 in countries that introduced ATAD CFC model A or B compared to other EU member states. For the manufacturing sector, a coefficient estimate at the *DID_atad_2018_2019* variable (*atad_cfc_model_2019*×*atad_2018_2019*) is insignificant, similar to a parameter estimate at the time dummy *atad_2018_2019* variable. This indicates that the ATAD CFC regulations introduced in 2018-2019 were inefficient for declining passive income flows due to dividends, interest and royalties, which is consistent with the H2 hypothesis. Thus, we have not found evidence that the tightened ATAD CFC regulation has reduced passive flows paid by payers from the manufacturing sector to recipients addressed in these tax instruments since 2019.

Table 13 **Tobit results for ATAD CFC rules for EU member states**

variable	entire sample	manufacturing	services
atad_2018_2019	0.0090***	0.0026	0.0108***
	(0.0018)	(0.0018)	(0.0016)
atad_cfc_model_2019	-0.0105**	-0.0225***	-0.0219***
	(0.00498)	(0.00257)	(0.0022)
DID_atad_2018_2019	-0.0143**	-0.0048	-0.0089***
	(0.0059)	(0.0031)	(0.0026)
cons	0.0471***	0.0363***	0.0415***
	(0.0015)	(0.0015)	(0.0013)
Number of observations	150,401	90,461	159,528
Number of groups	75,157	54,170	93,992
Wald test	84.67***	348.42***	567.83***
p-value	0.000	0.000	0.000

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

4.2. Results for micro-level approach

Based on the *D.ROS* and *D.ROA* variables measuring the difference between profitability in the following years, we answer the question **Q1**. The *D.ROS* variable breakdown shows that in the median, the loss on sales due to profit shifting is less than 1% of revenue, but in the third quartile, this loss is 10%, while the average loss due to transfers of profits is as much as 32% of revenue. The *D.ROA* variable breakdown shows that in the median, the loss in asset value due to profit shifting is a little over 1%; in the third quartile, the loss is more than 11%, and the average loss due to profit transfer is as much as 23% of asset value. The profit shifting is a sum of all taxable and non-taxable passive income payments to non-residents, including the export of cargo and passengers accepted for transportation in Polish ports by foreign enterprises, air navigation, interest, advisory, accounting and legal services, royalties, show business, payments from a foreign branch in Poland under Art. 21 and 22 of the CIT Act and capital gains, excluding dividends, by total operating turnover (*D.ROS*) or total assets (*D.ROA*), respectively.

The median *D.ROS* variable for services is 0.9316 pp. compared to 0.9997 pp. in the case of manufacturing. In contrast, the median *D.ROA* variable for the former sector equals 1.238 pp., which beats 1.1666 pp. for the latter sector. On average, the loss on sales due to profit shifting in services is 34.69 pp. of revenue, while it equals 24.08 pp. in the manufacturing industry. The

average loss in assets due to passive income transfers to non-residents is 25.84 pp. in services compared to 15.12 pp. in the manufacturing sector. When we focused only on payers of dividends, interest and royalties covered by the amendment WHT regulations, service companies lost on average 45.07 pp. of ROS and 33.695 pp. of ROA. In contrast, manufacturing firms' revenue profitability decreased by 30.53 pp. and the rate of return on assets dropped by 19.24 pp. These descriptive statistics show that service firms lose more on performance than manufacturing firms due to profit-shifting, which aligns with the **H3.**

The fixed-effects (FE) panel data estimation results enable an analysis of changes in sales profitability (ROS) and return on assets (ROA) due to profit shifting by each channel analysed. The results are presented in Table 14.

Table 14 **FE results for ROS and ROA**

variable	ROS	variable	ROA
ln_PS_dividend_a	0.0098***	ln_PS_dividend_s	0.0090***
	(0.0023)		(0.0028)
ln_PS_interest_a	-0.0469***	ln_PS_interest_s	-0.0248***
	(0.0063)		(0.00283)
ln_PS_license_a	-0.0108*	ln_PS_license_s	-0.0458***
	(0.0059)		(0.0079)
ln_PS_show_a	0.0389	ln_PS_show_s	0.1683**
	(0.0249)		(0.0684)
ln_PS_consulting_a	-0.0434***	ln_PS_consulting_s	-0.0590***
	(0.0038)		(0.0034)
_cons	0.0199***	_cons	0.0589***
	(0.0007)		(0.0008)
Number of observations	140,711	Number of observations	140,672
Number of groups	34,808	Number of groups	34,804
F test	45.62***	F test	103.99***
F test that all u_i=0	4.29***	F test that all u_i=0	4.40***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

The results for the rate of return on sales (ROS) allow us to conclude that profit shifting contributes to a decrease in the profitability of sales in terms of interest (4.7 pp.), licenses (1 pp.) and consulting fees (4.3 pp.). In contrast, no negative effect of profit transfer was shown for dividend payments. Performance services and the remaining channels (*transport, airlines, art, 21_22* and *equity*) were found to be insignificant.

Similarly, the estimates for the rate of return on assets model identify that profit shifting contributes to a decrease in return on sales for interest (2.5 pp.), licenses (4.6 pp.) and consulting fees (5.9 pp.) payments. In contrast, no negative effect of profit transfer was shown for dividend payments and show services. The remaining channels were found to be insignificant.

Next, we apply a fixed effects estimation using the free cash flow to the firm (*FCFF*) as the dependent variable to resolve **Q2** on how much free cash flow they could allocate to investments that fell due to profit shifting. The results of the estimation are presented in Table 9. The results point out that profit shifting contributes to a decrease in free cash flow in terms of interest payments (155%), licenses (127%) and consulting fees (237%) payments scaled by sales turnover. In contrast, equity injections (for which dividend payments constitute the cost of capital) could increase FCFF by 154%. The remaining channels (*transport, airlines, art,*

21_22 and *equity*) were found to be insignificant. The results for independent variables scaled by total assets are similar, i.e., profit shifting via interests (238%) and consulting fees (a 71% decrease in free cash flow to the firm). However, equity injections (for which dividend payments constitute the cost of capital) can increase FCFF by 197%.

Table 15 **FE results for FCFF**

variable	ln_FCFF	variable	ln_FCFF
ln_PS_dividend_s	1.5394***	ln_PS_dividend_a	1.9680***
	(0.2285)		(0.2128)
ln_PS_interest_s	-1.547***	ln_PS_interest_a	-2.387***
	(0.3001)		(0.9082)
ln_PS_license_s	-1.270*	ln_PS_license_a	0.1237
	(0.7222)		(0.6133)
ln_PS_consulting_s	-2.368***	ln_PS_consulting_a	-0.7125*
	(0.3547)		(0.4248)
_cons	3.2875***	_cons	2.9875***
	(0.0594)		(0.0642)
Number of observations	68,215	Number of observations	68,805
Number of groups	19,568	Number of groups	19,841
F test	33.71***	F test	23.62***
F test that all u_i=0	4,29***	F test that all u_i=0	1.54***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Third, we use the Tobit model estimation with the logarithm of capital expenditures (*CAPEX*) as the dependent variable to check for **Q3** how much their (taxpayers') investments in tangible and intangible assets dropped. We consider only new investments as opposed to disinvestments.

Table 16 **Tobit results for CAPEX**

variable	ln_CAPEX	variable	ln_CAPEX
ln_PS_airlines_s	-3.043**		
	(1.2616)		
ln_PS_dividend_s	-0.163***	ln_PS_dividend_a	0.0174
	(0.0619)		(0.0604)
ln_PS_interest_s	-0.649***	ln_PS_interest_a	-1.689***
	(0.0656)		(0.2068)
ln_PS_license_s	0.1073	ln_PS_license_a	0.0324
	(0.1850)		(0.1549)
ln_PS_consulting_s	0.2472***	ln_PS_consulting_a	-0.204*
	(0.0862)		(0.1091)
ln_PS_art2122_s	-0.662***	ln_PS_art2122_a	-0.581**
	(0.1710)		(0.2094)
		ln_PS_equity_a	4.8882*
			(2.9745)
_cons	9.6005***	_cons	9.5382***
	(0.0383)		(0.0387)
Number of observations	70,165	Number of observations	70,946
Number of groups	19,931	Number of groups	20,269
Wald test	122,93***	Wald test	83.01***
LR test p-value	0.000	LR test p-value	0.000

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

The exploration shows that profits shifted as passive income transfers for airfreight negatively influence potential investments in fixed and intangible assets on average by 304%, dividend payouts by 16%, interests paid by 65%, and transfers due to art 21&22 of the CIT Act by 66%. In comparison, capex is positively affected by foreign equity investments (by 489%). Consulting payments remain inconclusive as their impact differs when scaled by sales revenue (positive correlation, 0.2472) or total assets (negative correlation, 0.204).

Fourth, we inspect trade-offs of equity-based and debt-based FDI (for which passive income in the form of dividends or interest is paid) and intangible and intellectual capital (whose costs are paid via royalties and immaterial service fees). We seek to test **Q4** whether foreign capital adds to firm growth compared to domestic firms (i.e., without foreign shareholders) that did not transfer earnings to non-residents. For this purpose, we apply the fixed effects (FE) panel data approach and Arellano–Bond GMM estimator for dynamic panel data analysis, controlling for foreign shareholders. Our findings indicate that foreign equity and intangible capital do not boost firm growth in opposition to debt-based FDI and intellectual capital (consulting services). The former stimulates revenue and asset growth, while the latter only adds to firm growth when measured by an asset growth rate. The conclusions are insensitive to the chosen estimator for panel data analysis. This confirms that the findings are robust to the method used.
Moreover, the interaction between foreign ownership and various profit-shifting channels indicates stronger constraints for firm growth when financed with debt-based FDI or intellectual capital paid by immaterial service (i.e., consulting) fees. However, companies with foreign shareholders do not have significantly different growth.

Table 17 **Results for firm growth**

variable	FE	GMM	variable	FE	GMM
growth_S L1.		-0.0044*	growth_A L1.		0.0289***
		(0.0026)			(0.0038)
growth_S L2.		0.0163***	growth_A L2.		0.0257***
		(0.0015)			(0.0026)
			growth_A L3.		0.0096***
					(0.0016)
ln_PS_dividend_a	-0.165***	-0.0728***	ln_PS_dividend_s	-0.093***	-0.1454***
	(0.0389)	(0.0218)		(0.0259)	(0.0211)
ln_PS_interest_a	0.188***	0.1839***	ln_PS_interest_s	-0.0046	0.0635***
	(0.0626)	(0.0577)		(0.0209)	(0.0193)
ln_PS_license_a	-0.125**	-0.1227**	ln_PS_license_s	-0.164***	-0.0719
	(0.0549)	(0.0542)		(0.0575)	(0.0574)
ln_PS_consulting_a	0.0194	-0.0889***	ln_PS_consulting_s	0.2755***	0.0525**
	(0.0340)	(0.0335)		(0.0258)	(0.0251)
ln_PS_art21_22_a	-0.1901**	-0.1270*	ln_PS_art21_22_s	-0.037	-0.2366***
	(0.0832)	(0.0718)		(0.0625)	(0.0568)
foreign_shareholder	-0.041	-0.1008***	foreign_shareholder	-0.006	-0.044
	(0.0323)	(0.0386)		(0.0286)	(0.0327)
foreign_shareholder	0.0575		foreign_shareholder	-0.0289	
# ln_PS_dividend_a	(0.0421)		# ln_PS_dividend_s	(0.0303)	
foreign_shareholder	-0.1993***		foreign_shareholder	0.0769***	
#ln_PS_interest_a	(0.0875)		#ln_PS_interest_s	(0.0268)	
foreign_shareholder	-0.0134		foreign_shareholder	-0.0132	
# ln_PS_license_a	(0.0776)		# ln_PS_license_s	(0.0801)	
foreign_shareholder	-0.1549***		foreign_shareholder	-0.155***	
#ln_PS_consulting_a	(0.0488)		#ln_PS_consulting_s	(0.0339)	
foreign_shareholder	0.1300		foreign_shareholder	-0.1132	

# ln_PS_art21_22_a	(0.1030)		# ln_PS_art21_22_s	(0.0799)	
_cons	1.5989***		_cons	1.5388***	
	(0.0083)			(0.0074)	
Controls	NO	NO	Controls	NO	NO
Time effects	YES	NO	Time effects	YES	NO
N observations	1,024,657	402,747	N observations	1,087,936	312,468
Number of groups	225,869	105,006	Number of groups	236,244	83,681
F test	454.25***		F test	263.31***	
F test that all u_i=0	2.48***		F test that all u_i=0	2.36***	
Wald test		207.9***	Wald test		178.01***
Sargan test		1326.269	Sargan test		152.2693
p-value		0.0000	p-value		0.0000
Arellano-Bond test AR(1)		-219.02	Arellano-Bond test AR(1)		-166.44
p-value		0.0000	p-value		0.0000
AR(2)		0.6182	AR(2)		-1.0844
p-value		0.5364	p-value		0.2782

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

We also consider industry growth for the total population of passive income payers to non-residents and separate service and manufacturing industries using System GMM estimators. However, we found that foreign capital adds to the industry's growth when related to intangible capital paid by royalties (in manufacturing sectors), intellectual capital related to performance services (in both manufacturing and services) or knowledge of transport (in the service industry when considering revenue growth, while in manufacturing sectors when bearing in mind asset growth). These findings provide evidence that profit-shifting sometimes stimulates growth through foreign capital injections. Otherwise, payers perceive a drop in growth.

Table 18 **GMM results for industry growth proxied by revenue growth**

variable	entire sample	manufacturing	services
growth_S L1.	0.05187***	0.47483***	0.55180***
	(0.00844)	(0.01561)	(0.02410)
growth_S L2.		0.16297***	0.20332***
		(0.01555)	(0.01618)
ln_PS_transport_a		2.1703	**0.52903****
		(2.9539)	(0.20228)
ln_PS_airlines_a		-11.70***	
		(1.2730)	
ln_PS_dividend_a	-0.0928***	-0.4570***	-0.1884
	(0.02630)	(0.08655)	(0.11957)
ln_PS_interest_a	-1.088***	-0.3727*	-0.5363
	(0.27689)	(0.21177)	(0.41826)
ln_PS_licence_a	-0.4906**	**0.7567****	
	(0.18932)	(0.25099)	
ln_PS_show_a		**3.6522****	**2.5054****
		(2.0381)	(0.55333)
ln_PS_consulting_a	-0.1217	-0.3385***	-0.4973***
	(0.09543)	(0.08474)	(0.13719)
ln_PS_equity_a		-10.17	15.130***
		(0.11529)	(1.3571)
Number of observations	5 576	1 655	2 018
Number of groups	605	237	293
Wald test	75.29***	1241.61***	748.47***
Sargan test	215.3734	101.8559	99.2404

p-value	0.000	0.000	0.000
Arellano-Bond test AR(1)	-2.5943	-5.0752	-7.1041
p-value	0.0095	0.000	0.000
AR(2)	1.5228	-1.9402	-0.59125
p-value	0.1278	0.0524	0.5544

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Table 19 **GMM results for industry growth proxied by assets growth**

variable	entire sample	manufacturing	services
growth_A L1.	0.32923***	0.49309***	0.54384***
	(0.01467)	(0.01455)	(0.01794)
growth_A L2.		0.24783***	0.27350***
		(0.01690)	(0.02080)
ln_PS_transport_s	**2.6219****	**1.6500****	
	(0.99627)	(0.79054)	
ln_PS_airlines_s	**2.1209****		
	(0.97042)		
ln_PS_dividend_s	-0.0885***	-0.1239***	-0.2389**
	(0.02103)	(0.02855)	(0.09279)
ln_PS_interest_s	-0.1966**	0.01807	-0.1004
	(0.09182)	(0.01958)	(0.11237)
ln_PS_licence_s	-0.5959***	-0.0837	0.47489
	(.13697)	(0.08620)	(0.29655)
ln_PS_consulting_s	-0.2164**	-0.0206	-0.3835***
	(0.07164)	(0.02061)	(0.10625)
ln_PS_equity_s		-4.923**	-1.442
		(1.7617)	(2.6068)
N observations	5 597	1 656	2 021
Number of groups	604	237	293
Wald test	587.36***	2109.96***	1360.30***
Sargan test	270.814	78.3626	73.544
p-value	0.000	0.0004	0.0013
Arellano-Bond test AR(1)	-8.6144	-3.2828	-6.0485
p-value	0.000	0.0010	0.000
AR(2)	3.1039	-1.8623	-0.25022
p-value	0.0019	0.0626	0.8024

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Fifth, we check **Q5** to see whether passive income payers' leverage surpasses the debt ratio of nonpayers. To do it, first, we employ the t-Student test. This test confirms a significantly higher long-term debt-to-total assets ratio of payers of passive income to non-residents.

Table 20 **t-Student test for leverage**

variable	N	payer	N	nonpayer	difference	t	p-value
leverage	135,512	0.0618	2,767,812	0.0279	0.03396	-96.41	***
		(0.0005)		(0.0001)			

*** p < 0.01, in parentheses deviations of estimators (standard errors).

Second, we estimate the panel Tobit model uncensored (first column), right-censored upper 0.015 and left-censored under 0.015, controlling for foreign shareholders and any passive

income transfers to non-residents (*payer* dummy variable). Results confirm that passive income payers have higher leverage, except those financed with equity-based FDI who pay dividends. Similarly, foreign-owned companies are more long-term indebted, except for lower leverage percentiles under 0.015. Passive income payers' leverage surpasses the debt ratio of nonpayers when they transfer airfreight charges, interests, royalties, and immaterial service fees to non-residents.

Table 21 **Tobit results for leverage**

variable	xttobit	xttobit ul(0.015) low debt	xttobit ll(0.015) high debt
ln_PS_transport_s	-0.0157	-0.0006*	-0.3419
	(0.0131)	(0.0004)	(0.2215)
ln_PS_airlines_s	0.0277**	0.0002	0.0417
	(0.0139)	(0.0005)	(0.0759)
ln_PS_dividend_s	-0.0040***	0.00003	-0.0131
	(0.0014)	(0.00004)	(0.0114)
ln_PS_interest_s	0.0251***	0.0005***	0.0509***
	(0.0011)	(0.00002)	(0.0041)
ln_PS_license_s	0.0086***	-0.00005	0.0400***
	(0.0029)	(0.0001)	(0.0153)
ln_PS_show_s	-0.0059	-0.0017**	-0.2145
	(0.0214)	(0.0007)	(0.1834)
ln_PS_consulting_s	0.0053***	-0.00001	0.0162***
	(0.0013)	(0.00003)	(0.0056)
ln_PS_art21_22_s	-0.0048	-0.00004	0.0091
	(0.0031)	(0.0001)	(0.0160)
ln_PS_equity_s	-0.0346	-0.0002	-0.0688
	(0.0266)	(0.0009)	(0.1658)
payer	0.0279***	0.0016***	0.2021***
	(0.0004)	(0.00001)	(0.0027)
foreign_shareholder	0.0056***	0.0001	0.0146***
	(0.0005)	(0.00002)	(0.0046)
foreign_shareholder#ln_PS_license_s	-0.0100**		
	(0.0044)		
foreign_shareholder# ln_PS_show_s	-0.0788*		
	(0.0436)		
foreign_shareholder# ln_PS_consulting_s	-0.0037**		
	(0.0018)		
foreign_shareholder# ln_PS_art21_22_s	0.0080*		
	(0.0043)		
payer#ln_PS_dividend_s		-0.0002***	-0.0248*
		(0.0001)	(0.0150)
_cons	0.0275***	0.0018***	-0.9212***
	(0.0002)	(0.0001)	(0.0023)
Controls	YES	NO	NO
Number of observations	2,900,324	2,900,324	2,900,324
Number of groups	267,542	267,542	267,542
Wald test	7810.2***	12688.21***	6398.12***
LR test p-value	0.000	0.000	0.000

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

Finally, we scrutinise **Q6** to check how profit-shifting affects the debt capacity of passive income payers compared to nonpayers. We use the fixed effects (FE) panel model approach for

this test, controlling for foreign equity. Our outcomes indicate that domestic companies that transfer air transport passive income, dividends, immaterial service fees and capital gains related to Art. 21 and 22 of the CIT Act to non-residents have higher debt capacity contrary to beneficiaries of foreign equity injections that pay for foreign airfreights and consulting, pay out dividends or capital gains to non-residents. Companies that transferred passive income last year due to dividends could increase debt capacity. However, foreign-owned companies' engagement in profit-shifting in the previous period decreases debt capacity, especially when exploring channels based on dividends, immaterial and performance services or airfreights. On the contrary, equity-based and debt-based FDI allow for increasing debt capacity.

Table 22 **FE results for debt capacity**

variable	FE	variable	FE	FE, payer=1
ln_PS_transport_s	-0.2951	l.ln_PS_transport_s	-0.4579*	-0.384
	(0.2399)		(0.2400)	(0.2383)
ln_PS_airlines_s	0.8846***	l.ln_PS_airlines_s	0.4447	0.8072
	(0.3263)		(0.3443)	(0.6857)
ln_PS_dividend_s	0.0536*	l.ln_PS_dividend_s	0.0640*	0.1341**
	(0.0297)		(0.0375)	(0.0632)
ln_PS_interest_s	0.0135	l.ln_PS_interest_s	0.0205	0.0817**
	(0.0265)		(0.0294)	(0.0330)
ln_PS_show_s	-0.678	l.ln_PS_show_s	-0.255	0.1090
	(0.4395)		(0.4304)	(0.4319)
ln_PS_consulting_s	0.1265***	l.ln_PS_consulting_s	0.0087	-0.0931***
	(0.0284)		(0.0303)	(0.0356)
ln_PS_art21_22_s	0.1865***	l.ln_PS_art2122_s	-0.0575	-0.0434
	(0.0685)		(0.0736)	(0.0870)
ln_PS_equity_s	0.1842	l.ln_PS_equity_s L1	0.3024	0.2324
	(0.3887)		(0.3777)	(0.3423)
foreign_shareholder	-0.7417***	foreign_shareholder	-0.7426***	
	(0.0303)		(0.0305)	
foreign_shareholder#ln_PS_airlines_s	-1.0521*	foreign_shareholder	-1.0145*	
	(0.5906)	#l.ln_PS_airlines_s	(0.5630)	
foreign_shareholder#ln_PS_dividend_s	-0.1546***	foreign_shareholder	-0.1205***	-0.1686***
	(0.0341)	#l.ln_PS_dividend_s	(0.0412)	(0.0666)
foreign_shareholder#ln_PS_consulting_s	-0.0631*	foreign_shareholder	-0.0736*	
	(0.0367)	#l.ln_PS_consulting_s	(0.0396)	
foreign_shareholder#ln_PS_art2122_s	-0.3023***			
	(0.0874)			
		foreign_shareholder		-1.5110*
		#l.ln_PS_show_s		(0.7852)
_cons	-0.8834***	_cons	-0.8130***	-0.9170***
	(0.0168)		(0.0118)	(0.0529)
Controls	YES	Controls	YES	YES
Time effects	YES	Time effects	YES	YES
Number of observations	1,077,494	N observations	1,065,869	93,684
Number of groups	232,531	Number of groups	231,760	26,919
F test	408.02***	F test	388.24***	85.24***
F test that all u_i=0	4.64***	F test that all u_i=0	4.64***	5.15***

* p < 0.1, ** p < 0.05, *** p < 0.01, in parentheses deviations of estimators (standard errors).

5. CONCLUSIONS

In this study, we identified the determinants, effects and trade-offs of different channels of profit-shifting from Poland. Because literature so far has focused on determinants, channels and scale of profit shifting to countries with harmful tax competition, we contribute by assessing the trade-offs of MNE subsidiaries' and nonaffiliated payers' engagement in profit-shifting. We benefit from a quasi-experimental setting due to the amendments to withholding tax and anti-tax avoidance directive ATAD for controlled foreign company (CFC) regulations introduced in EU member states in 2018 or 2019. On the macro level, we applied the Knowledge-Capital theoretical framework and a Difference-in-Differences (DiD) approach to assess the effects of these regulations. We prove that the tightened WHT regulation has reduced passive flows paid by payers from the manufacturing sector to recipients addressed in these tax instruments, contrary to the services sector. Thanks to substituting restricted channels of transfers above two mln PLN with assets management fees, it was possible to avoid WHT taxation. However, interests or royalties, counted as separately transferred, increased. Thus, only dividends and payouts decreased. Service providers have reduced passive flows due to dividends, interest and royalties to countries that introduced ATAD CFC model A or B in 2018-2019 compared to other EU member states.

On a micro-level, we identified externalities of engagement in profit-shifting strategies by exploiting unique administrative tax data on passive income flows to 134 countries made by 40,000 corporate residents. Our research identified that profit shifting decreases profitability in terms of interest (4.7 pp.), licenses (1 pp. of ROS and 4.6 pp. of ROA) and consulting fees (4.3 pp. of ROS and 5.9 pp. of ROA). On average, the loss on sales due to profit shifting in services is 34.69 pp. of ROS, while it equals 24.08 pp. in the manufacturing industry. The average loss in ROA from passive income transfers to non-residents is 25.84 pp. in services compared to 15.12 pp. in the manufacturing sector. When we focused only on payers of dividends, interest and royalties covered by the amendment WHT regulations, service companies lost on average 45.07 pp. of ROS and 33.695 pp. of ROA. In contrast, manufacturing firms' revenue profitability decreased by 30.53 pp. and the rate of return on assets dropped by 19.24 pp.

Furthermore, passive income for non-residents contributes to a decrease in free cash flow in terms of interest payments (155%), licenses (127%) and consulting fees (237%) payments scaled by sales turnover. In contrast, equity injections (for which dividend payments constitute the cost of capital) could increase FCFF by 154% (when compared to sales) and 197% (compared to assets). Besides, we explored that profits shifted as passive income transfers for airfreight negatively influenced potential capital expenditures on average by 304%, dividend payouts by 16%, interests paid by 65%, and transfers due to art 21&22 of the CIT Act by 66%. Still, capex is positively affected by FDI.

Our findings indicate that debt-based FDI and intellectual capital boost firm growth. Although we discovered stronger constraints for growth when financed with debt-based FDI, we found that foreign capital adds to the industry's growth when related to intangible capital paid by royalties (in manufacturing sectors), intellectual capital related to performance services (in both manufacturing and services) or knowledge of transport (in the service industry when considering revenue growth, while in manufacturing sectors when bearing in mind asset growth). We confirm that passive income payers' leverage surpasses nonpayers' debt ratio

when they transfer airfreight charges, interests, royalties, and immaterial service fees to non-residents, except those financed with equity-based FDI who pay dividends. Our results imply that domestic firms that transfer airfreight fees, dividends, immaterial service fees and capital gains related to Art. 21 and 22 of the CIT Act to non-residents have higher debt capacity than beneficiaries of foreign equity injections. The latters' engagement in profit-shifting in the previous period decreases debt capacity, especially dividends, immaterial and performance services, or airfreights payers. Our outcomes confirm that equity-based and debt-based FDI allow for increasing debt capacity. This way, our findings build original and unique value added to existing knowledge on profit-shifting mechanisms, outcomes and externalities. Our conclusions provide vital implications for policymakers who make economic decisions that influence trade-offs between FDI flows to boost industry growth and withhold taxation to limit profit-shifting via passive flows to non-residents, mainly outside the EU.

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