DO LINKS TO TAX HAVENS AFFECT COMPANIES' FINANCIAL PERFORMANCE? THE CASE OF SLOVAKIA

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Abstract: *This paper aims to quantify the impact of direct equity ownership links between Slovak companies and tax havens. We distinguish between three types of tax haven: onshore, midshore and offshore. The financial impacts are measured by indicators of profitability (ROA); activity (total asset turnover); liquidity (current ratio); and bankruptcy (IN05). To measure the impacts, we link the Bisnode and Finstat databases. The first database lists those Slovak companies that had links with tax havens during 2005–2015. The second provides financial statements for all Slovak companies. It was found that: 1) There are statistically significant differences in all investigated indicators between Slovak companies with and without links to tax havens. Those with links to tax havens generally reported worse economic situations and levels of performance compared to those without such links. We conclude that having a parent company resident in a tax haven had a negative effect on financial performance. 2) There are statistically significant differences between the selected indicators of company performance, across the different categories of tax haven, and for companies with no links to tax havens. 3) Those with no such links show statistically significant correlations between all their examined performance indicators. But for those companies with links to tax havens, the only statistically significant correlation was between profitability and the remaining indicators. 4) Companies with ownership links to tax havens are clearly engaged in profit-shifting activities. The results suggest opportunities for follow-up projects, especially focusing on different industries and company size that could specify their heterogeneous approaches and variability in objectives.*

Keywords: Financial situation, profit-shifting, Slovak companies, tax haven, decision tree.

JEL Classification: F23, H25, H26.

Introduction

Tax havens are both a controversial and thrilling area of research. Since the last financial crisis there has been a dramatic increase of research interest in this area. The most frequently researched areas in relation to tax havens can be divided into positive: for example, attracting more foreign direct investments (FDI), or potentially increased financial performance and productivity, and negative: for example, aggressive tax planning, money laundering or machinations in public procurements. The last decade's research results suggest the value of a focus on negative outcomes: aggressive tax planning, related profit-shifting techniques, and the consequences of having anonymous

ultimate beneficial owners (UBO). In the Slovak business environment, research on tax havens has been long neglected. In contrast to other jurisdictions, there are no academic studies that might inform improvements in tax legislation, or provide support for the Financial Administration of the Slovak Republic.

Khouri et al. (2019) provide empirical evidence that Slovak companies with direct ownership links to tax havens contribute significantly less corporate income tax to the state budget, compared to their wholly domestically owned counterparts. We can anticipate what a more detailed analysis of Slovak companies may reveal, by looking at research on the closely related Czech Republic. Nerudová et al. (2020) compared Czech companies with and without links to tax havens and investigated the profit-shifting channels through Panama Papers destinations. Moravec et al. (2019) evaluated and quantified the tax revenue losses imposed on the Czech Republic by profit shifting, and compared them to other EU countries. Brychta and Sulik-Górecka (2019) compared legal regulations for Advance Pricing Agreements (APAs) in the Czech Republic and Poland, and provided de lege ferenda proposals (transfer pricing is generally viewed as a key profit-shifting channel). Tax competitiveness, especially in tax legislation, is also a crucial factor in determining the choice of profit-shifting methods and techniques. Jedlička (2018) considers intellectual property as a significant area in tax competition. The research of Banociová and Táhlová (2019) confirms the existence of corporate income tax competition between EU countries.

The objective of this study is to quantify differences in financial situations and common relations between key variables, as the direct results of profit shifting techniques and tax optimization by companies with links to certain tax haven jurisdictions. A company was defined to have a link with a tax haven if its partial or total ownership was registered in an offshore, midshore or onshore jurisdiction. Each jurisdiction is specified as to the countries involved.

There are four partial objectives focused on the financial situation of both linked and non-linked companies, and on common relations between variables from different financial areas. Each objective is connected to a separate research question, and the results are statistically assessed. The comparison of financial indicators of linked and non-linked companies is intended to explore the impacts of profit-shifting techniques. Similarly, differences between each tax haven category are examined with focus given to potential deviations in profitability, activity, liquidity or survival, expecting significantly lower results in companies with certain tax links. A final analytical part focuses on common relations between variables, employing several statistical tests, including predictive modelling.

1. Theoretical Background

Profit-shifting channels have been the subject of detailed investigations. Ramboll and Corit (2015) and ZEW (2016) divide the aggressive tax channels into three groups: 1) interest payments (debt); 2) royalty payments; and 3) strategic transfer pricing. Transfer pricing and debt have attracted the most attention. According to Brada and Bus (2009), both new and older literatures focus on transfer pricing and other economic factors. The purpose is to decide whether firms have any objective, other than tax optimization.

Radu (2012) treats tax havens as a continuing problem because they reduce the tax revenues of high-tax countries. Offshore financial centers (OFCs) or offshore tax havens facilitate the growing mobility of finance by providing zero or low taxes, low or no regulation, high secrecy and an anonymity that allows capital to wander the world leaving little or no evidence of its passage. OFCs play a significant role in tax avoidance and tax evasion, money laundering, high capital mobility, degradation of regulation, potential instability and economic underdevelopment (Sikka, 2003; Rose & Spiegel, 2006). Aijaz (2013) provides a discussion of additional features of tax havens, such as political stability and minimum exchange control restrictions.

Tytko et al. (2018) analyze the offshore zones' role in laundering money obtained by illegal activities. Jayaraman and Choong (2010) note that offshore financial centers are usually small tropical jurisdictions that levy no direct taxation. They conclude that the contribution of OFCs' institutions to the growth of Vanuatu is insignificant, and they argue for the introduction direct taxation. Pieretti et al. (2011) develop a model where investors can choose to deposit their savings in different sized countries, and

they argue that small tax havens encourage inter-country competition that in the long-run benefits investors.

There is currently no generally recognized list of tax havens, no definitive criteria marking a certain jurisdiction as a tax haven, or for categorizing types of tax haven. But a range of organizations publish significantly overlapping lists of jurisdictions that they consider have some characteristics of tax havens. For example, the EU publishes a list of non-cooperative jurisdictions for tax purposes (European Council, 2020). The OECD has developed a List of Uncooperative Tax Havens (OECD, 2020) and the Financial Action Task Force publishes the Black list, and the overview of high-risk and other monitored jurisdictions (FATF, 2020). The Tax Justice Network (2020) has developed a methodologically well-regarded Financial Secrecy Index, and Jansky et al. (2018) provide several lists of tax havens based on selected criteria linked mainly to secrecy and potential harmful practices.

As to the financial aspects of relations between a parent company and its subsidiary, the profit and cash operations seem to be crucial. Multinational companies may carry out many treasury operations in tax havens to avoid what they see as extraordinary obstructions arising from-national legislation (Dyreng & Lindsey, 2009). Hanlon et al. (2005) report that the levels of tax noncompliance by US foreign-controlled subsidiaries are more than double those of domestically-controlled firms. Therefore, the ownership structure of a multinational company has an impact on the tax base (Brada & Bus, 2009).

Dewi and Cynthia (2018) show that, amongst the investigated determinants, only liquidity has an influence on tax aggressiveness. Corporate social responsibility (CSR), earnings management and company size have no impact on tax aggressiveness. Tax optimization had a substantial impact on firms' liquidity, because the potential benefits, including lower or no fees, higher interest earnings, and weaker regulation motivated companies to relocate cash into tax haven banks.

Tax planning strategies have been found to exert a negative effect on a firm's liquidity (Nwaobia et al., 2016; Lestari & Wardhani, 2015). The latter argue that tax optimization helps to minimize tax burdens, but exposes companies to potential financial difficulties. The

motive for holding cash, according to traditional theory, arises from the objective of maximizing shareholder wealth, which is achieved by comparing marginal benefits and costs (Dittmar et al., 2003). This helps the parent company but potentially harms its subsidiaries. Unaffiliated firms hold greater cash reserves on their balance sheets than their affiliated peers. Group affiliation significantly decreases cash holdings.

Saksessia and Firmansyah (2020) state that tax avoidance and corporate governance is negatively associated with earnings quality. Desai et al. (2004) suggest that increases in corporate tax rates have a negative influence on revenues when the ownership structure is more concentrated and corporate governance is weaker. Marschner et al. (2019) divided their sample of Brazilian companies into two groups: large and small. The latter group's growth of sales and liquidity were positively and significantly related to their book-tax differences, but negatively related to their leverage.

The results reported by Salah (2019) suggest that tax planning has no significant direct effect but has significant indirect effects on earnings management via net deferred tax liabilities. Bartelsman and Beetsma (2000) state that cross-border profit-shifting can cause a productivity increase to be mismeasured. Procházka (2019) highlights, in relation to profit-shifting activities, that unclear tax motives obstruct an appropriate assessment of the financial performance of subsidiaries by external data analysts. Gill-de-Albornoz and Rusanescu (2018) state that subsidiaries with foreign owners have less incentive to avoid modified auditor reports, and that this is linked to their lower dependence on external financing.

Essentially tax planning has a series of impacts on companies that employ it. Companies want to minimize their taxes, but they also want to be solvent and profitable, offer benefits for current and potential shareholders and thus increase their corporate value. The nexus of such relationships commonly leads to conflicts between managers and owners in which profit and cash are frequent areas of dispute. In addition, Tafel-Viia and Alas (2009) have stressed that corporate social responsibility (CSR) may also generate conflict between managers and owners. This is because profits and liquidity can influence and be influenced by a company's performance on CSR.

Many studies have shown that there is a relationship between a firm's liquidity, size and profitability (Almazari, 2013; Kartal, 2016), but their focus has been on particular industries or countries, rather than on the jurisdictional type of tax havens, as in this study.

2. Research Objective, Methodology and Data

2.1 Objective of the Study

The objective of this study is to quantify the differences in companies' financial situations, and the common relations between their key variables, that arise as the direct result of profit shifting and tax optimization. We consider that a company is linked to a tax haven if its partial or total ownership (equity linkage) was registered in an offshore, midshore or onshore jurisdiction.

We divided the tax havens identified by Bisnode into three categories, based on the possibility of using individual companies on the first ownership level (tax, law and economic purposes):

a) Offshore jurisdictions (OFF): Bahamas, Belize, Bermuda, the British Virgin Islands, Gibraltar, Guernsey (the United Kingdom), Jersey (the United Kingdom), the Isle of Man (the United Kingdom), the Cayman Islands, the Marshall Islands, the Netherlands Antilles, Panama, and Seychelles.

b) Midshore jurisdictions (MID): Hong Kong, Cyprus, Malta, the United Arab Emirates, the United States of America.

c) Onshore jurisdictions (ON): Liechtenstein, Latvia, Luxembourg, Monaco and the Netherlands.

According to Bisnode (2020), by the end of 2019, 4,996 Slovak companies had a direct ownership link (equity linkage) to tax havens. This number had grown every year since 2005, when 1,510 companies had links. It even increased after 2015, when the government introduced its tax base erosion and profit shifting, and automatic exchange of information policies.

In 2019 the fastest growing tax haven partner for Slovak companies was the USA. With 1,228 direct ownership links it was also the largest such partner, followed by the Netherlands with 1,163, and Cyprus with 1,059. Panama was the most popular offshore jurisdiction, with 137 links, though that had been in gradual decline since 2016.

The research sample excludes several jurisdictions that could also be defined as tax havens and are commonly used by Slovak companies. For example, by the end of 2019, 1,532 Slovak companies had direct ownership links, valued in excess of a billion EUR, to the United Kingdom (Bisnode, 2019). These links have grown steadily, from 988 in 2015. It seems likely that after BREXIT this increase will continue.

Tab. 1 sets out the four partial research objectives we identified, and the consequent research questions that require answers.

Tab. 1: Formulation of partial objectives and research questions

Objective	Research question
O_1 – To identify differences in the financial situation of both tax haven linked and non-linked companies	RQ_a: What are the statistically significant differences between financial performance indicators generated by tax haven linked and non-linked companies?
O_2 – To differentiate the financial results by type of tax haven	RQ_b: What are the statistically significant differences between indicators generated by offshore, midshore, and onshore companies, and by companies without links?
O_3 – To quantify common relations between ratios	RQ_c: What are the statistically significant correlations between liquidity, risk, activity and profitability, for two subsets of companies: those with and without links to tax havens?
O_4 – To categorize and generalize the given set of financial data	RQ_d: What are the general financial features of companies, grouped on the basis of their links to different types of tax havens?

Source: own

Research questions were formulated based on the literature summarized above. From a Slovak perspective, previous studies were more focused on partial than on general outcomes. For example, on debt or interest expenses as profit-shifting techniques; or on the impact of transferring the registered office on reported values of land and structures (Ištok et al., 2018; Ištok & Kanderová, 2019a, 2019b); or the impact on effective tax rates and profitability of securing a link to a tax haven (Khouri et al., 2019). So, formulating the research questions required us to make some trade-offs with respect to the combination of approaches we applied. We assumed that tax planning and optimization will have certain effects that can be measured via financial ratios. We also assumed that in practice the financial ratios are commonly interconnected, with varying degrees of predictability and strength. Finally, we expected that both the strength of the interconnections and types of jurisdiction have impacts that are observable in a firm's performance.

2.2 Data and Methods

The list of companies with links to a tax haven was obtained from the Bisnode database that also offered a partial categorization of countries as tax havens. The database yielded a set of companies that moved to a tax haven in the period 2005–2015, and their financial statements were obtained from the Finstat database. To select a relevant research sample, we ensured that companies had (1) a properly completed financial statement; (2) a valid corporate ID number; and (3) a classifiable tax haven link. Sole traders and non-active businesses were excluded, along with the 3.2% of companies that had at least one indicator that seemed to be an outlier. To produce a valid comparison between those companies with, and those without links to tax havens, we randomly selected 5% of ordinary companies with no links to tax havens. Thus, our sample for comparisons had 7,906 randomly selected companies without links, and 2,116 companies with links to one of the tax haven jurisdictions.

We chose return on assets (ROA) as our proxy for profitability, as it measures profits in relation to the capital at risk. Turnover (activity) is represented by total assets turnover in order to minimize the effect of size and specific industries. It is also a good measure of the

activity of a business. For liquidity, the current ratio was used as a proxy variable, with a focus on cash management. The final variable was a measure of risk. For this we applied the IN05 bankruptcy prediction model, which perfectly fits the economic conditions of Central Europe. The higher the score, the lower the probability of bankruptcy. We chose this bankruptcy model over a host of alternatives because it is conformed to Central Europe, can make 60% of predictions two years prior to the potential risk situation, and at 63% was a good predictor of bankruptcies (Gundová, 2015).

Both classification analysis and causal analysis was applied to the descriptive statistics. High variability in the dataset led us to use the mathematical median as the primary decisive value. Means and standard deviations were used only as dummy variables. The statistical significance of differences was assessed using the nonparametric Mann-Whitney test, because the data did not meet the required assumptions for t-tests. The test was first applied to two independent groups – companies with and without links to tax havens. Then we broadened our study by testing our assumptions on non-tax haven companies, compared to those linked to each of the three sets of offshore, midshore and onshore tax havens.

Relationships between variables were measured by the Spearman correlation coefficient. This can vary from -1 to 1. A positive value indicates a direct correlation, while a negative value indicates that as one variable rises the other falls. This measures the degree of dependency between the variables. The closer the coefficient is to 1 or -1, the more perfect the correlation. The significance threshold was set at 0.05.

To build a predictive model we divided companies into subgroups. Financial indicators were divided into four groups, representing the quartile values of each indicator. Quartile values for each Slovak industry (with respect to NACE categories) are published annually in the Cribis database (www.cribis.sk). These quartile values were then linked to the fourfold division of our sample of companies, depending on whether they had no links to tax havens, or were linked to offshore, midshore or onshore havens. In the case of bankruptcy (IN05), we used companies' scores to divide the sample into the three categories of bankruptcy candidates, grey zone companies and safe zone businesses.

Predictive models were created through data mining and text analytics software – SPSS Modeler. The visual outputs of its algorithms are neural networks or decision trees. For our analysis we created several decision trees that predict the impact of ownership links to lower tax jurisdictions on selected financial indicators. The tree is built by splitting the source set of data, constituting the root node of the tree, into subsets, according to a set of classification characteristics. The decision trees can be also described as a combination of mathematical and computational techniques, used to aid the description, categorization and generalization of a given data set.

3. Results and Discussion

The fact that tax havens offer more opportunities than threats for companies is evidenced by the growing number of multinationals located in them, and by the growing efforts of governments and international organizations to regulate them. While a common view is that tax havens erode the tax base of high-tax countries, some argue that under certain conditions their existence can enhance efficiency and even mitigate tax competition (Dharmapala, 2008; Radu, 2012). Of course, such efficiency is differently perceived at macroeconomic (fiscal policy) and microeconomic (company performance) levels. As this paper focuses on differences between tax haven and non-tax haven companies, or different tax haven jurisdictional types, our chosen methodology and criteria respect this viewpoint.

In order to answer the first research question: *"What are the statistically significant differences between financial performance indicators generated by tax haven linked and non-linked companies?",* the descriptive statistics and non-parametric Mann-Whitney test (Tab. 2) were used to compare the two data sets for tax haven and non-tax haven companies. In 2015, the return-on-assets (ROA) indicator for Slovak non-tax haven companies was just 0.09%.

Naturally, the values of such indicators vary significantly by industry, but move more uniformly with the state of the macroeconomy. For example, most companies' indicators of return fall in the event of a crisis (Siminica et al., 2012). In this case the median company's ROA kept growing – in some industries as a result of post crisis stimulation. On the other hand, its value for tax haven companies was just 0.02%, and the means for both groups were significantly lower, indeed negative, reflecting the huge share of loss-making companies in both groups.

Christian and Schultz (2005) note that the ROA in parent companies located in tax havens should be relatively high when compared to a non-tax haven affiliate. For example, in the USA it was 7.8% compared to 1.3%. We are unable to compare domestic ROA with foreign ROA as we are missing data for tax haven residence. But the difference between companies having a link, and those that do not (0.02% versus 0.09%), when significant, indicates that profit shifting may be relevant.

Liquidity, represented by the current ratio, also showed a difference between tax haven (0.19) and non-tax haven linked companies (0.47). Both results are far from ideal values, but contrary to ROA, higher statistical means show that both groups of companies contain some extraordinarily solvent members that have maximized cash holdings and minimized liabilities.

It was already documented that, on average, tax avoidance is associated with a lower future return on equity (ROE) and a lower return on net operating assets (RONOA). Moreover, an inefficient utilization of assets results in lower future profitability for tax aggressive firms (Katz et al., 2013). In order to prove such a relation between asset use and profitability, we included total assets turnover as a descriptive statistic, because it also helps capture the firm's efficiency in employing operating assets to generate sales (Nissim & Penman, 2001). From this viewpoint, companies without a tax link are more efficient in generating sales, as 1 EUR invested in assets brought 1.13 EUR in sales, while companies with a link generated just 0.30 EUR. This is consistent with claims of Katz et al. (2013) that (primarily) SMEs under-utilize their assets.

As adopting the tax planning policy suggests certain negative financial outcomes – lower profitability, liquidity, and assets efficiency – and these were also confirmed above – one of our aims was to explore the potential threats from such outcomes. Although a significant relationship between financial distress and tax avoidance was not confirmed by Tilehnouei et al. (2018), we applied the distress model IN05 developed in the Czech Republic. The models for financial distress prediction are numerous and have a long history, although over time the methods of data processing

Tab. 2: Descriptive characteristics of financial indicators (proxy values)

Jurisdiction			ROA	Current ratio	Index IN05	Total asset turnover
With no links	N	Valid	7,906	7,906	7,901	7,906
		Missing	0	0	5	0
	Mean		−0.39	35.14	33.86	4.01
	Median		0.09	0.47	1.24	1.13
	Std. deviation		33.39	838.75	2,056.57	167.32
With links	N	Valid	2,129	2,105	2,173	2,116
		Missing	44	68	57	0
	Mean		−1.34	6.32	361.60	2.51
	Median		0.02	0.19	0.72	0.30
	Std. deviation		50.49	66.63	8,443.19	25.33

Source: own

and criteria preferences have changed. Although bankruptcy models still dominate this area of inquiry, their recent modification and new counterparts highlight the fact that the assumptions used for fitting the original models are often no longer valid, due to changing economic environments and legal frameworks, or incomparability between populations of interest (Kollár et al., 2016).

So, we applied IN05 in preference to other standard variations in distress or bankruptcy models, because it is better suited to the economic relations of Central Europe. While companies without tax links reached a median IN05 value score of 1.24 and were categorized as businesses in a 'grey zone', the situation for companies with tax links was clearer, as they were categorized as bankruptcy candidates. On the other hand, this result was expected, as most of the distress predictions are based on profitability and liquidity indicators that are, in both theory and practice, as presented above, proof of profit shifting operations. We do not consider potential bankruptcy as a critical problem, as almost all of the procedures leading companies into such a state were intentionally adopted to shift profits.

After applying the Mann-Whitney test (Tab. 3) we have completed part of the comparison of jurisdictions. It is clear that at the 5% significance level there are statistically significant differences between the two groups of companies, for all four criteria – return on assets, current ratio, total assets turnover and distress situation.

When answering the second research question: *"What are the statistically significant differences between indicators generated by offshore, midshore, and onshore companies, and companies without links?"*, the best median

Tab. 3: Mann-Whitney test (financial indicators)

Jurisdiction		ROA	Current ratio	Index 05	Total asset turnover
With links – without links	Mann-Whitney U	6,748,341.5	6,847,599.5	7,786,409.5	6,156,234.5
	Wilcoxon W	9,015,726.5	9,064,164.5	10,150,000	8,396,020.5
	Z	−14.056	−12.505	−6.647	−18.694
	Asymp. sig. (2-tailed)	0	0	0	0

Source: own

Tab. 4: Median values of financial indicators specified for tax haven jurisdictions

Jurisdiction	ROA	Current ratio	Index IN05	Total assets turnover
Without link	0.09	0.47	1.24	1.13
Offshore	0.0011	0.3189	0.6386	0.1609
Midshore	0.0018	0.1721	0.7193	0.1894
Onshore	0.0503	0.1893	0.735	0.5942

Source: own

of return on assets was found in onshore related businesses, although its size (0.05%) is still lower than in companies with no links. The current ratio was highest in offshore companies that were also the most probable bankruptcy candidates, while onshore companies had the fastest total assets turnover. Thus, we can conclude that offshore linked companies have the lowest profitability while midshore together with onshore companies have the lowest liquidity (Tab. 4).

When focusing on company performance in different types of jurisdiction, the Mann-Whitney test also recorded significant differences, at the 5% significance level, except for the current ratio in the case of a 'no links'/offshore comparison (Tab. 5).

Liquidity is an instrument of a company's common operations that affects its development and growth. It also provides acts as a safety net in the event of unanticipated expenditures. But because it does not appear to directly contribute to earnings it is sometimes viewed as a restraint on performance (Sanger, 2001). In previous research, Den and Oruc (2009) found a positive correlation between working capital and ROA, while Eljelly (2004) found a negative relation between the current ratio and ROA. Results are quite variable across countries, industries, the state of the business cycle and growth performance.

Tab. 6 shows the correlation results between the indicators for Slovak companies without tax haven links. The strongest correlation (0.685),

Tab. 5: Mann-Whitney test (financial indicators by category of jurisdiction)

Jurisdiction		ROA	Current ratio	Index 05	Total asset turnover
Without links – OFF	Mann-Whitney U	733,062.5	933,602	867,354	612,350.5
	Wilcoxon W	764,940.5	964,478	900,250	643,976.5
	Z	−7.149	−1.281	−3.883	−10.325
	Asymp. sig. (2-tailed)	0	0.2	0	0
Without links – MID	Mann-Whitney U	2,769,053	2,941,712.5	3,413,527	2,380,782
	Wilcoxon W	3,204,764	3,367,215	3,871,930	2,809,057
	Z	−12.469	−9.599	−4.913	−17.399
	Asymp. sig. (2-tailed)	0	0	0	0
Without links – ON	Mann-Whitney U	3,246,226	2,972,285	3,505,528.5	3,163,102
	Wilcoxon W	3,692,266	3,409,865	3,966,808.5	3,605,372
	Z	−6.543	−9.807	−3.834	−7.47
	Asymp. sig. (2-tailed)	0	0	0	0

Source: own

between ROA and INO5, has a straightforward interpretation. The greater the profitability of the company, and hence its ROA, the higher is its IN05 score, and hence the lower is its risk of bankruptcy. The correlation between liquidity and profitability was very weak (0.098), but was significant. This contrasts with the findings of Svitlík and Poutník (2016), who found no such significant link for Czech companies.

For Slovak non-tax haven companies, there was a weak correlation (0.216) between profitability and turnover. The only negatively correlated indicators were liquidity and turnover ratios (−0.069). So, the higher the turnover and hence business activity, the lower the cash might be because the money cycle is short, and the cash gap is quickly bypassed. Barinov (2014) reported similar results.

For tax haven linked companies, results were very limited and so are not shown in detail. The only statistically significant correlation was between profitability and the remaining indicators, very weak with liquidity (0.057) and bankruptcy probability – IN05 model (0.065), while it was moderate for assets turnover (0.432).

We would expect a stronger relationship with bankruptcy threats, as the more profitable firms should be less vulnerable, and profitability is built into the IN05 model. On the other hand, return on assets was very low for tax haven linked companies, so it is possible that other bankruptcy prediction factors influenced the results. The most likely was leverage, which we did not focus on in this research.

The results of the statistical tests suggest that there are quite significant differences between the results of financial performance indicators comparing companies without links to tax havens, to companies in various types of lower tax jurisdictions. In order to expand our research and answer the research question: *"What are the general financial features of companies grouped on the basis of their links to different types of tax havens?"*, we used a predictive modelling function. Specifically, we used SPSS modeler – software incorporating data mining and text analytics. The results of these statistical and data mining algorithms are incorporated into decision trees. We have analyzed the impact of ownership links to lower tax jurisdictions on selected indicators of financial performance. The results are presented in Fig. 1.

For the companies taken together, the results for ROA are rather evenly spread across the

Tab. 6: Correlation between financial indicators for non-tax haven companies

			Turnover	Current ratio	IN05	ROA
Spearman's rho	Turnover	Correlation coefficient	1	−0.069	0.216	0.285
		Sig. (2-tailed)	–	0	0	0
		N	7,906	7,906	7,901	7,906
	Current ratio	Correlation coefficient	−0.069	1	0.246	0.098
		Sig. (2-tailed)	0	–	0	0
		N	7,906	7,906	7,901	7,906
	IN05	Correlation coefficient	0.216	0.246	1.000	0.685
		Sig. (2-tailed)	0	0	–	0
		N	7,901	7,901	7,901	7,901
	ROA	Correlation coefficient	0.285	0.098	0.685	1
		Sig. (2-tailed)	0	0	0	–
		N	7,906	7,906	7,901	7,906

Source: own
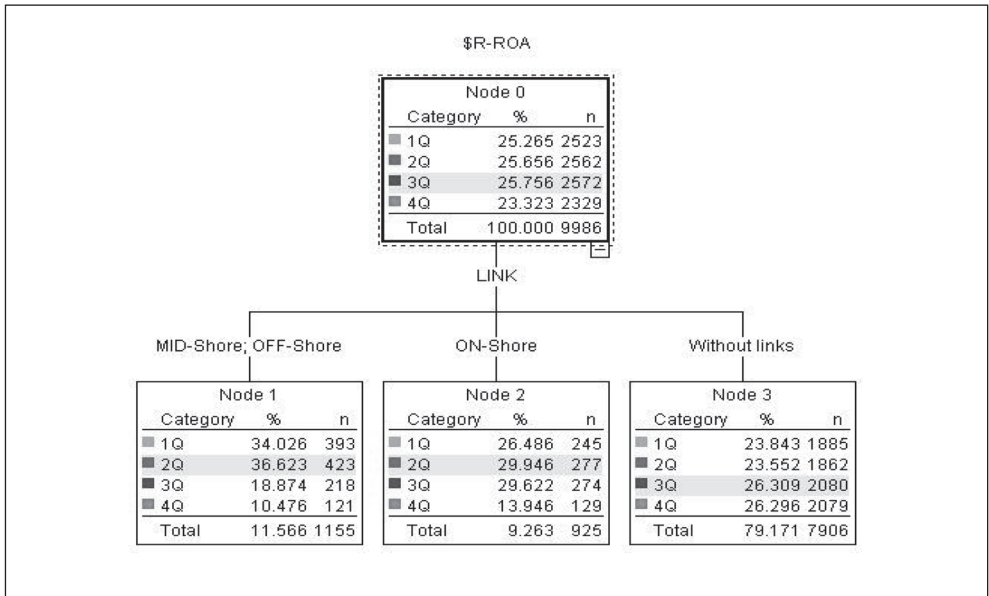
Source: own

variable's range of values. In all four quartiles, representation is 23–26% of companies. The distribution is relatively uniform. On the second level, the modelling algorithm divided the companies into three subsets with similar ROA values, which provided us with a much more transparent view of profitability among companies than the basic descriptive statistics in Tab. 2. The first subset consists of companies with links to midshore and offshore jurisdictions. The results for the midshore category were as expected. As already noted, lower values of ROA, and effective tax rates (ETR), are indicators of aggressive tax planning.
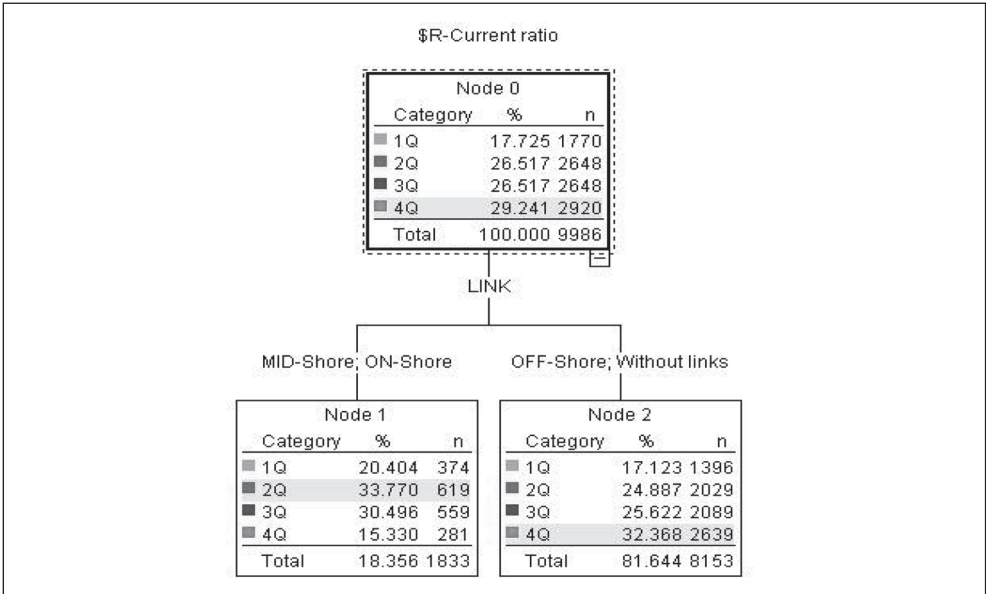
The results for the offshore category cannot be fully explained by the application of profit-shifting techniques and the company's foreign residency. Our research did not include data on the size of the ownership interests from the given categories of tax havens. We believe that future research should focus deeper into the offshore category, and try to explain why companies with direct ownership links to offshore companies report worse ROA results. These results could be explained by, for example, illegal activities, including company tunneling and money laundering; repatriation of accumulated profits from abroad; or using the offshore category as so-called 'shell companies' whose only purpose is to hold assets, for example ownership interests in other companies, without engaging in any economic activities.

The second subset consists of onshore companies, and the third subset contains companies without links to tax havens. But it is clear that the lowest ROA were recorded by companies in the first subset: the midshore and offshore group. 34% of these companies have ROA in 1Q and only 10% in 4Q. Companies in the second subset (onshore) report better financial positions, since, taken together 60% of this group are in 2Q and 3Q. The highest ROA is achieved by companies without links to tax havens. 50% of them report values of ROA in 2Q and 3Q, and the next 26% are in 4Q. Based on these results we can state that the more aggressive the tax planning strategies companies use, the lower the ROA they report.
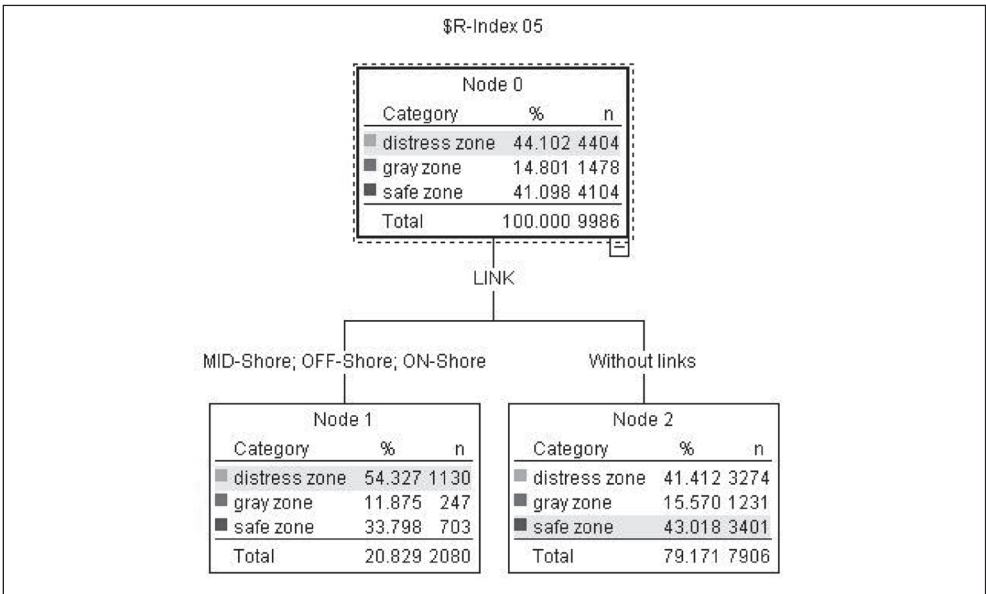
Looking at the results across all companies, 18% of them report a current ratio in the lowest quartile 1Q, with 26.5% of companies recording the liquidity indicator in the second quartile,

Fig. 2: Decision tree current ratio by ownership links

$R-Current ratio

Node 0

Category	%	n
1Q	17.725	1770
2Q	26.517	2648
3Q	26.517	2648
4Q	29.241	2920
Total	100.000	9986

LINK

MID-Shore; ON-Shore   OFF-Shore; Without links

Node 1

Category	%	n
1Q	20.404	374
2Q	33.770	619
3Q	30.496	559
4Q	15.330	281
Total	18.356	1833

Node 2

Category	%	n
1Q	17.123	1396
2Q	24.887	2029
3Q	25.622	2089
4Q	32.368	2639
Total	81.644	8153

Source: own

Fig. 3: Decision tree INDEX05 by ownership links

$R-Index 05

Node 0

Category	%	n
distress zone	44.102	4404
gray zone	14.801	1478
safe zone	41.098	4104
Total	100.000	9986

LINK

MID-Shore; OFF-Shore; ON-Shore   Without links

Node 1

Category	%	n
distress zone	54.327	1130
gray zone	11.875	247
safe zone	33.798	703
Total	20.829	2080

Node 2

Category	%	n
distress zone	41.412	3274
gray zone	15.570	1231
safe zone	43.018	3401
Total	79.171	7906

Source: own

26.5% in the third quartile, and 29% in the highest quartile. Looking at the second level of the decision tree, it is obvious that the two groups report similar results, though the first, comprising midshore and onshore companies, has somewhat poorer liquidity outcomes.

In order to examine companies' likely future financial positions, we used the index IN05 (Fig. 3), which is one of the most appropriate bankruptcy models for the Slovak business environment. We divided the reported values by descriptive zones, rather than by quartiles (see methodology). It is interesting that the largest group of all companies is in the distress zone (44%). However, a large group is in the safe zone (41%), with only 15% in the grey zone. The data mining algorithm then divided companies into two similar groups, with the first one consisting of all companies in lower tax jurisdictions and the second one of all companies without links to tax havens. It is clear that a more insecure future is predicted for companies in tax havens, with 54% within IN05's distress zone, and only 33% in the safe zone. In contrast, 41% of companies without links to tax havens are in the distress zone, and 43% are in the safe zone.

The last indicator we analyzed was an indicator of company activity level – total asset turnover. When we look at the first level of the decision tree, it is clear that the companies' activity levels fall almost naturally into quartiles. But on the second level, the modelling software divided our companies into three subsets. The first comprised companies with links to midshore and offshore jurisdictions. The second subset had companies that were in onshore jurisdictions, and the third comprised companies without links to tax havens. The worst results for total asset turnover were reported by companies in midshore and offshore jurisdictions. A significant majority of them (57%) reported values in 1Q, while only 26% were in 3Q and 4Q. 43% of companies with links to onshore jurisdictions reported activity value indicators in 1Q. But a significantly greater 52% of them in 2Q and 3Q taken together. Companies without links to tax havens reported indicator levels evenly across all four quartiles.

Our most comprehensive decision tree analyses what we consider to be the two most important financial indicators (see annex). Specifically, these are ROA at the first level and IN05 at the second level. Ownership links to tax havens are handled at the third level. Looking at the first level, the division of ROA into subsets by quartile values was almost uniform.

From then on, at the second level, the algorithm computes ROA and IN05, dividing the companies into three subsets. The first consists of all companies in the distress zone. The ROA values for these companies are very low – 44% of them report ROA in 1Q, 34% in 2Q, 16% in 3Q and less than 6% in 4Q. In the second subset, the algorithm includes all companies in the grey zone. Based on the results it is clear that ROA for these companies is significantly higher. A large majority of them recorded values of ROA in 3Q, but only 12% in 1Q, 27% in 2Q and 14% in 4Q. The final subset at this level comprises all companies in the safe zone. These recorded the highest values of ROA – 10% in 1Q, 14% in 2Q, 28% in 3Q and as much as 46% in 4Q.

At the third level, the modelling algorithm also included ownership links. In general, 54% of all companies (hence 54% of non-tax havens, 54% of offshore, 54% of midshore and onshore respectively) are in the subsets of distress zones, 13% are in grey zones, and 33% are in safe zones. It is clear that generally midshore and offshore companies are in the worst financial positions. For all three zones, when ROA is compared to IN05, the ROA data always recorded the lowest values. The onshore companies recorded slightly higher values of ROA. The algorithm also confirms our finding that non-tax haven companies are the most successful. The second important finding is a suggestion that foreign ownership linkage (parent company resident in tax haven) has a generally negative effect on the financial performance of Slovak companies. As we have categorized the companies based only on the type of tax haven, the results can differ amongst differently sized groups or different sectors (as noted by Marschner et al., 2019). We consider that a further extended investigation in this direction will generate interesting results. But according to Dewi and Cynthia (2018), the size of the company is unrelated to its tax aggressiveness.

Conclusion

Of course, the fact that multinationals are commonly linked with tax havens has clear economic explanations. It is mostly because taxes are lower. But also, it may be related to

the fact that a company with a presence in many countries needs to coordinate the financial activities of its whole network. However, the question remains: what makes purely domestic companies become more international and look for tax haven domiciles? From a long-term perspective, it may be an expectation that continued growth and expansion requires or is made easier by an international presence. From a shorter run profit perspective, it is an effort to cut taxes, despite ample evidence from tax competition studies that tax rates and consequent payments are negligible in relation to total assets.

It may also be that companies do not want to pay taxes that they feel are inefficiently used. On the other hand, links to a tax haven have also become popular for speculative reasons. There may be special risks attached to this form of profit-shifting. But it may provide additional benefits, such as an attractive residential location, or a way of hiding the ultimate beneficial owner of a company, which seems to be a common practice in many Slovak state budget, interconnected public procurements.

Regardless of their motives, our research showed significant differences in the financial situations of companies that do or do not have links to certain types of tax haven jurisdictions. In the case of the ROA or the current ratio indicators, it is clear that companies linked to tax havens can generate lower values by profit-shifting and cash pooling. Simultaneously these parent companies can increase the vulnerability of a domestic subsidiary, though an accurate measurement of the increase in risk is complicated by the retained links, including the possibility of reverse financial transfers to subsidiaries in difficulties. The correlation analysis showed revealing differences between the two groups of companies. Non-tax haven companies had significant correlations between all of their financial ratios. But in tax haven-oriented companies, the correlation is significant only for profitability.

We believe that the results of this paper suggest significant directions for further research. Specifically, we did not confirm three of our four formulated research questions: that there is a significant difference between companies; that offshore linked companies have lower profitability; and that profitability is significantly correlated with liquidity. Our view is that because companies' financial performance

varied, measured by proxy variables, this is proof of a profit-shifting effect. Although the consequent increase in risk might appear to increase firms' vulnerability, in fact modern financial regimes offer many ways to remove it, by either financial transactions (dividends, investments) or by legal actions (assets, mergers). Our results suggest that the use of selected tax havens on a first ownership level (direct equity links) could provide a competitive advantage for the company's financial position.

We consider that our analysis of tax havens' links to Slovak companies is the most important outcome of the project. But it needs to be updated due to the time that has passed since the data was collected, and because of subsequent changes in tax legislation. The results are also useful for the Financial Administration of the Slovak Republic, and can be used in the risk analysis of tax subjects with direct ownership links to tax havens. Policymakers can use this information when adopting new tax provisions or amending existing income tax acts related to international taxation, to minimize the use of profit-shifting techniques. From an international viewpoint, the methodology and results of this research could inform future tax legislation reforms.

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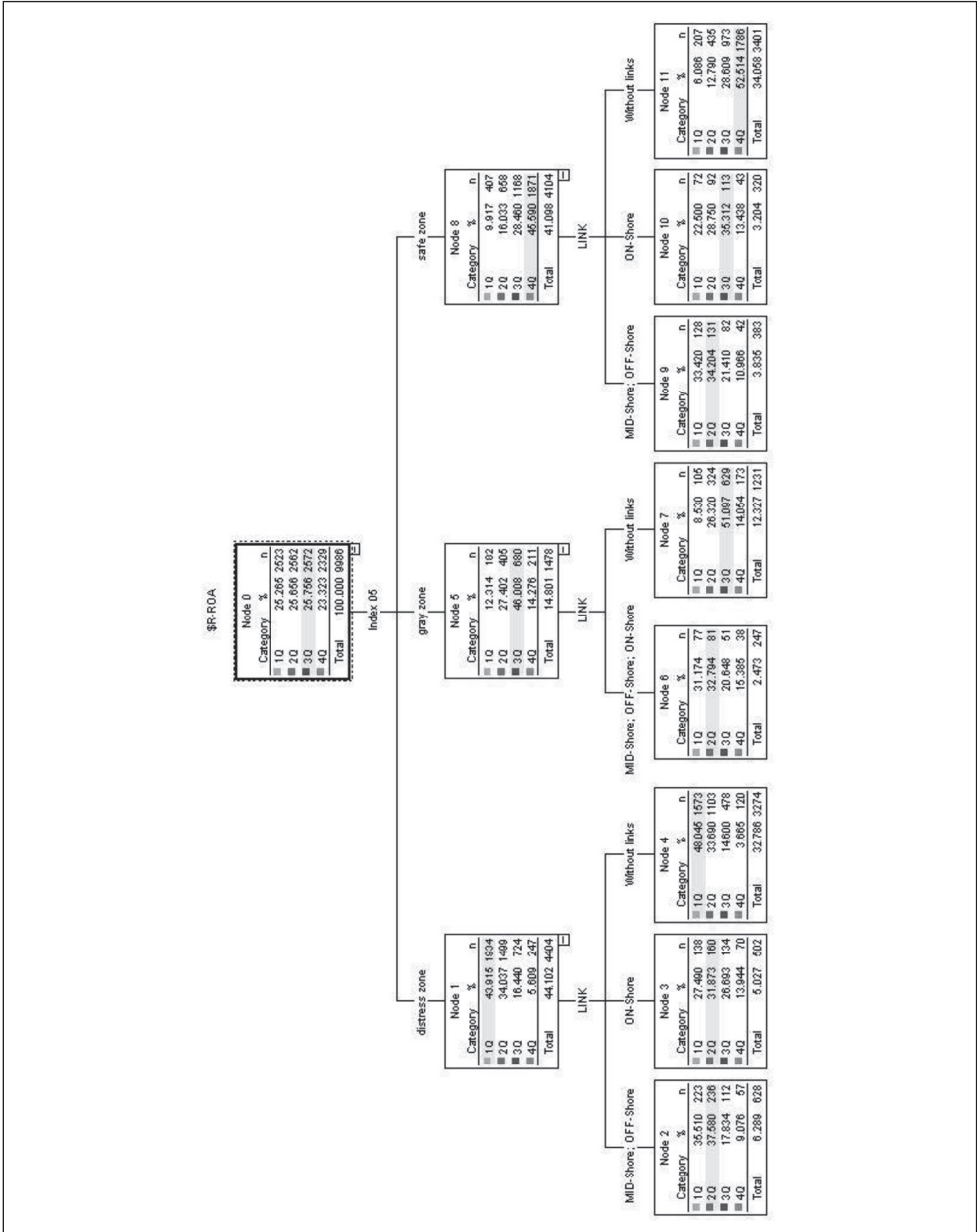
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Appendix

Fig. A1: **ROA vs. INDEX05 vs. ownership links**

Source: own