Charles University in Prague

Faculty of Social Sciences
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MASTER'S THESIS

Determinants of the Demand for Tax Haven Operations: Empirical Evidence from the Czech Republic

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used for obtaining another or equal degree.

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Prague, May 5, 2016

Signature

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Abstract

The aim of this thesis is to explore the firm-specific determinants of the demand for tax haven operations by Czech firms. Our objective is to better understand the firms' incentives for tax haven use, and furthermore whether there exists cross-haven heterogeneity in those incentives. The thesis examines the firms' tax haven investment behaviour by analysing firm-level data for 15,530 Czech firms for year 2013. To the extent of our knowledge, this has been the first research of its kind devoted to Czech firms. The evidence suggests that larger, more profitable firms with larger international presence are most likely to use tax havens. The analysis also indicates that higher firm indebtedness is associated with greater likelihood of establishing tax haven operations. This would suggest Czech firms engage in profit shifting through the use of debt financing. Furthermore, service firms were found to be more likely to use tax havens than manufacturing firms. This contrasts with previous research where R&D intensity was a leading indicator of tax haven use. Additionally, we found significant cross-haven heterogeneity in the determinants, particularly in the sector-specific characteristics. In our sample, service firms favoured Cyprus and the Netherlands, while manufacturing firms preferred Luxembourg and Switzerland. The findings of the thesis suggest policy makers turn their focus to service firms engaging in tax haven use, and to debt financing as the method used for profit shifting. We also propose concentrating on tax haven countries individually rather than considering them a homogenous group.

JEL Classification	F21, F23, H87
Keywords	tax haven, determinants of demand, tax base erosion, profit shifting, tax avoidance, Czech Republic, logit

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Abstrakt

Tato práce se zabývá analýzou klíčových faktorů ovlivňujících poptávku českých firem po daňových rájích. Cílem je hlubší porozumění motivaci firem k užívání daňových rájů, a zda se tato motivace výrazně liší v závislosti na vybraném daňovém ráji. Diplomová práce podrobně analyzuje firemní data 15 530 českých firem z roku 2013 s cílem prozkoumat investiční chování těchto firem v daňových rájích. Pokud je nám známo, jedná se o první analýzu svého druhu zaměřenou na firmy České republiky. Výsledky potvrzují, že větší, ziskovější a více mezinárodní firmy jsou častějšími uživateli daňových rájů. Analýza také naznačuje pozitivní vztah mezi vyšší zadlužeností firmy a pravděpodobností podnikání v daňových rájích, což poukazuje na to, že české firmy používají dluhové financování jako metodu přesouvání zisků. Data překvapivě ukazují větší zájem o daňové ráje ze strany firem podnikajících ve službách než ze strany výrobních firem. Tento poznatek je v rozporu s předchozími studiemi, kde intenzivní výzkum a vývoj (R&D) byl důležitým indikátorem užívání daňových rájů. Navíc byla zjištěna výrazná heterogenita faktorů ovlivňujících poptávku po jednotlivých daňových rájích, především se jednalo o sektorová specifika. Zatímco výrobní firmy v našem vzorku preferovaly Lucembursko a Švýcarsko, firmy podnikající ve službách dávaly přednost Kypru a Nizozemsku. Z našich výsledků vyplývá několik doporučení pro tvorbu politiky. Především navrhujeme zaměřit se na firmy z oblasti služeb, které odcházejí do daňových rájů, a také na dluhové financování jako metodu používanou k přesouvání zisků. Dále je důležité soustředit se na země daňových rájů jednotlivě a nepovažovat je za homogenní skupinu.

Klasifikace JEL	F21, F23, H87
Klíčová slova	daňový ráj, determinanty poptávky, narušování daňového základu, přesouvání zisku, obcházení daňové povinnosti, Česká republika, logit

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Master's Thesis Proposal

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Proposed Topic:

Determinants of the Demand for Tax Haven Operations: Empirical Evidence from the Czech Republic

Motivation:

The impact of tax havens on the global economy or on the economy of individual countries continues to be of great importance. Companies are shifting their profits into jurisdictions with low or non-existent taxes – so called tax havens – and that contributes to tax base erosion and consequent loss of tax revenues in the countries of origin. Not only does that impact the income of the country's government, it can also hinder economic growth of said country. Nevertheless, tax havens can impact the non-haven countries positively as well.

Recently, growing number of papers have been dedicated to the impact of tax havens on the global economy or on the economy of individual countries. Hines (2010) and Dharmapala (2008) point out that tax havens provide opportunities for international tax planning and encourage tax avoidance by multinational corporations (MNCs), which contributes to tax base erosion and loss of tax revenues. Murphy (2009) estimated the tax losses that arise from the use of tax havens by UK companies as high as £18.5 billion per annum. Furthermore, tax havens facilitate a disproportionate fraction of the world's FDI. Over 20% of U.S. FDI goes through tax haven affiliates (Hines & Rice, 1994). Nonetheless, several recent papers indicated that tax haven activity can stimulate the growth of operations of non-haven countries within the same region (Desai et al., 2004; Desai et al., 2006a) and can contribute to financial market competition (Hines, 2010). As testified by these studies, the impact of tax havens – whether good or bad – on the world economy is significant.

On the other hand, what motivates the companies to decide to relocate to tax havens/acquire tax haven affiliate remains largely unexplored. The motivation of companies to use tax havens is of great importance as it explains the driving force behind the demand for tax haven operations. What drives the companies to seek the services tax havens have to offer? And what type of companies does turn to tax havens most often? Desai et al. (2006b) analyzed data of American firms and determined that large international firm with substantial intrafirm trade and R&D investments are more likely to use tax havens. Based on data collected from German manufacturing firms, Gumpert et al. (2011) concludes that facing higher foreign tax rates corresponds with higher probability of owning tax haven affiliates. Markle and Robinson (2012) examine how the mechanisms used by countries in order to prevent tax base erosion (CFC and tax system) influence the behavior of MNCs in 28 different countries. The aim of this thesis is to further explore the main determinants of the demand for tax haven operations – specifically, the impact of various firm-specific characteristics – in the case of the Czech Republic.

Hypotheses:

1. Hypothesis #1: Large and profitable companies are more likely to own a subsidiary in tax haven.
2. Hypothesis #2: High R&D intensity increases the propensity of a company owning a subsidiary in tax haven.

3. Hypothesis #3: Lower debt-to-assets ratio increases the propensity of a company owning a subsidiary in tax haven.

Methodology:

I will follow the approach used in recent studies by Markle and Robinson (2012), Voget (2011) and Desai et al. (2006b), who all choose logistic regression in favor of probit regression. There is no empirical evidence that would justify the use of logistic over probit model in one case or another. Nevertheless, some believe that in the case where we have disproportionately more of one outcome over the other in binary choice, the logistic regression might be more appropriate. In order to test the individual hypotheses, I will therefore use a logistic regression where the dependent variable is binary – it will equal 1 if the parent has a subsidiary in a tax haven and 0 otherwise.

To determine whether a company is a "tax haven user" and to obtain firm-specific data on companies, I will use a firm-level dataset provided by Bureau van Dijk in the Amadeus database. It contains financial and ownership data on companies worldwide. For the analysis, I will be using a subset containing data on Czech companies and MNCs with a subsidiary in the Czech Republic.

To test for the individual hypotheses, different specifications of the logistic regression will be used. The accuracy of hypothesis 1 can be seen from the coefficient on variables representing size and profitability of a company. My expectation is that both of these variables will have positive effect on the probability of owning a subsidiary in tax haven. Hypothesis 2 can be tested by including dummy variables for different sectors. The NACE classification can be used in order to distinguish between different sectors. In this specification the coefficients of sector-specific dummies will measure the propensity of the company to own a tax have subsidiary depending on the sector. Hypothesis 3 is based on the work of Graham and Tucker (2006). They examined a group of tax shelters and found that using a tax shelter was associated with lower use of debt. To address this hypothesis I will focus on the coefficient on the debt-to-asset ratio. I expect the effect of indebtedness on using a tax haven to be negative, which would be in line with Graham and Tucker (2006).

Expected Contribution:

Seeing as majority of the existing research is focused on the link between tax systems and tax haven use (Markle and Robinson (2012), Voget (2011), Maffini (2012)), I will focus primarily on the link between firm-specific characteristics and the use of tax havens. Existing research on how various firm characteristics influence tax haven demand is limited to the U.S. companies by Desai et al. (2006b) and German companies by Gumpert et al. (2011). Recently, Jones and Temouri (2013) were the first to attempt comprehensive analysis of tax haven use incentives for companies worldwide. I will attempt to verify whether the conclusions from existing research are consistent with the case of the Czech Republic. This will also allow determining whether the incentives for tax haven use are consistent across regions or not. In addition, I will explore the link between company indebtedness and tax haven use. To my knowledge this empirical analysis will be the first of this kind including companies from the Czech Republic. The empirical evidence from this thesis will help with the understanding of the demand for tax haven operations among Czech companies and could provide useful information for the tax authorities.

Outline:

1. Motivation: The impact of tax havens on the economy of the world has been discussed by many researchers in the recent years. The motivation, however, behind the use of tax havens remains largely unexplored. Nevertheless, this topic is of great importance as it explains the driving force behind the demand for tax haven operations.
2. Literature review: I will give a brief overview of the existing research in the area and the methods used for this research question.
3. Data: I will explain where I collected the data as well as give detailed description of the collected data.
4. Method: I will explain the use of a logistic regression model and the reason why it is the most suitable method in this case.
5. Results: I will discuss the regression results and robustness checks.

6. Concluding remarks: I will summarize my findings and the possible implications they carry.

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Author **Supervisor**

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Acronyms

AIC	Akaike Information Criterion
BEPS	Base Erosion and Profit Shifting
BIC	Bayesian Information Criterion
CFC	Controlled Foreign Company
DTA	Double Tax Agreement
EU	European Union
FDI	Foreign Direct Investment
GUO	Global Ultimate Owner
LPM	Linear Probability Model
MEM	Marginal Effects at Means
MLE	Maximum Likelihood Estimation
MNC	Multinational Corporation
NACE	Statistical Classification of Economic Activities in the European Community
OECD	Organization for Economic Co-operation and Development
PE	Permanent Establishment
R&D	Research & Development
UK	United Kingdom
U.S.	United States

1 Introduction

Tax havens continue to be an important and powerful player in the world economy. Recent financial crisis and the uncovering of several cases of highly sophisticated tax planning – most recently the leak of the so called Panama Papers – have brought tax havens into the spotlight. The impact on the economy of non-haven countries, both positive and negative, is of great significance and continues to be at the forefront of policy debates around the world. Largely missing from these debates are studies concerning determinants of tax haven demand, and the empirical evidence on the firm-specific characteristics that influence the demand is scarce as well. The motivation and incentives of companies that lie behind their decision to relocate to tax havens or to acquire tax haven affiliate thus remain unexplored to a great extent. The motivation of companies to use tax havens, however, is of great importance, as it explains the driving force behind the demand for tax haven operations and given the issue's significance, the lack of attention dedicated to it is surprising.

Perhaps the most crucial questions to be asked are: What drives the companies to seek the services tax havens have to offer? What is the effect of firm-level financial indicators on a company's decision to set up tax haven operations? What type of companies does turn to tax havens most often? Do all types of companies engage in this kind of activity? Or is the propensity for tax haven use restricted to specific sector of companies? The goal of the thesis is to attempt to answer these questions concerning firms in the Czech Republic and, by doing so, to contribute to the slowly growing body of academic literature on this topic. The uncovering of these incentives could possibly provide guidance for countries' governments and policy makers to better combat the issue of tax havens and the associated tax base erosion and profit shifting.

The objective of this thesis is to empirically examine the firms that undertake tax haven activity in the case of the Czech Republic and, by doing so, to further explore the main determinants of the demand for tax haven operations – specifically, the impact of various firm-specific characteristics on the demand. The thesis attempts to verify whether the conclusions from existing research (Jones & Temouri, 2013; Gumpert et al., 2011; Desai et al., 2006b) are applicable to the case of the Czech Republic. This

will also allow for determining whether the incentives for tax haven use are consistent across regions, or whether there is some heterogeneity present in the demand for tax haven use in different countries. In addition, we will dedicate special attention to investigating the link between company indebtedness and tax haven use.

Also, in contrast with most of previous research, which generally treats tax havens as a homogenous group, we consider the possibility of some heterogeneity being present. Therefore, we introduce an approach of analysing individual tax haven countries and the demand for their use separately in order to explore potential cross-haven heterogeneity in tax haven use. The objective is to understand whether the firm-specific determinants of tax haven use vary significantly depending on the choice of specific tax haven. Furthermore, the thesis attempts to uncover cross-sector heterogeneity in the determinants of tax haven use as well.

To the extent of our knowledge this empirical analysis will be the first of its kind conducted on a dataset of companies from the Czech Republic. The empirical evidence from this thesis will help with deeper understanding of the determinants of the demand for tax haven operations among Czech companies, and could provide useful information for tax authorities as well as suggestions for policy makers.

The remainder of the thesis is structured in the following order. Section 2 describes the motivation behind the choice of the thesis topic and discusses the main positive and negative economic effects of tax havens on the world economy. Additionally, Section 2 summarizes the existing relevant literature on the topic of determinants of tax haven use and outlays the hypotheses that are to be tested further in the thesis. Section 3 provides a detailed description of the data used in the analysis, in particular the collection of the original data, how a tax haven and a tax haven user are defined, how the R&D intensity is measured, and summary of all the variables used throughout the estimation. Section 4 outlays the empirical methodology and describes the logit model specifications used in the analysis in more detail. Section 5 provides a summary of the results of the empirical part of the thesis, discussion of the main findings and their implications for policy makers and possible future research. Finally, Section 6 concludes on the most important findings of the thesis.

2 Literature review

2.1 Economic effects of tax havens

High-tax jurisdictions are continuously expressing concern over the negative effects of tax havens on their economies. In particular, recent cases of highly sophisticated and aggressive international tax planning have been one of the widely discussed topics in their debate. Multinational corporations (MNCs) are employing various strategies in order to optimize their tax obligations. They are attempting to shift their profits into jurisdictions with low or non-existent taxes – so called tax havens – to minimize their tax burden. This contributes to tax base erosion and consequent loss of tax revenues in the countries where the profits are originated. Tax havens could also attract economic activity that might have taken place in a high-tax jurisdiction otherwise. Not only does that impact the income of the country's government, it can also hinder economic growth of said country. Moreover, the heterogeneity of tax policies may encourage excessive tax competition among governments.

Nevertheless, tax havens can impact the non-haven countries positively as well. The nature of tax competition is changed by the existence of tax havens, as they allow countries to retain their high tax rates. These are effectively reduced for the international mobile capital, but they still apply for the immobile domestic capital. Therefore, the high-tax countries are able to sustain considerable tax base (Hines, 2010). The financial and other economic activity in tax havens can stimulate activity elsewhere. In fact, countries in close proximity to tax havens tend to exhibit faster real income growth than other countries. And proximity to a tax haven can enhance the competitiveness of the country's banking sector as well.

The impact of tax havens on the global economy or on the economy of individual countries continues to be of great importance. In recent years, growing number of papers has been dedicated to evaluating the impact of tax havens on the world. As was indicated above, in general there are two opposing opinions on this matter. Some academics believe almost religiously that tax havens are sources of nothing but problems for the world economy represented mainly by profit shifting and

tax base erosion. They represent the view that the prosperity of tax havens comes at the expense of countries with high taxes, while others feel that tax haven activity can contribute to the economic growth of directly involved and even the nearby countries with positive spill-overs (Hines, 2005). Let us examine the effects more closely.

2.1.1 Negative effects

Hines (2010) points out that tax havens provide opportunities for international tax planning and encourage tax avoidance by multinational corporations that seek to reduce their taxable income in high-tax jurisdictions. By attracting such corporate activity, tax havens contribute to tax base erosion and loss of tax revenues of high-tax countries (Dharmapala, 2008). Tax havens are also said to distort markets by creating inefficiencies, and to cause financial instability (Murphy, 2011).

The amount of lost tax revenue resulting from tax haven use is truly staggering. Several attempts to estimate these losses have been made over the last decade. Murphy (2009a) estimates the tax losses that arise from the use of tax havens as high as £18.5 billion per annum, of which £3 billion can be attributed to large UK companies. Schneider et al. (2013) claim that tax havens cost state governments $26 billion in lost revenues from corporate taxation alone. These two estimates, however, appear largely conservative in the light of the numbers estimated by Klinger et al. (2010), who predict U.S. banks and MNCs to use tax havens in order to avoid at least $37 billion in U.S. taxes each year. Clausing's (2009) findings further support this view, as she assesses the annual corporate tax gap in the U.S. is as high as $60 billion.

Tax revenue losses are caused mainly by profit shifting and tax base erosion. Zucman (2014) estimates that profit shifting to low-tax jurisdictions reduces the corporate tax payable of U.S.-owned companies by almost 20%. Janský & Prats (2015) assert that MNCs with links to tax havens reported 1.5% lower profits. These MNCs also paid 17.4% less taxes per unit of assets and 30.3% less taxes per unit of profit than companies with no tax haven links. These findings further support the growing belief that the existence of tax haven links encourages MNCs to engage in profit shifting behaviour and other tax avoidance practices, since they face much greater incentives and opportunities. Even OECD (2013) admitted that tax havens distort markets and thus cause misallocation of economic resources, which could in the end threaten the credibility of the world's corporate tax system.

Furthermore, tax havens facilitate a disproportionate fraction of the world's foreign direct investment (FDI) (Dharmapala, 2008). They are recipients of large flows of both direct and portfolio investment from high-tax countries. Hines (2005) presents evidence that FDI is sensitive to local tax rates. Also, due to the existence of tax differences, high-tax jurisdictions attract less investment than low-tax jurisdictions. Small tax haven countries then draw disproportionately more investment from other countries than what could be justified by their small economies and populations. According to Palan et al. (2010), approximately 30% of the world's FDI is routed through tax haven countries and roughly the same share is in turn originated in tax havens. Hines & Rice (1994) estimate that over 20% of U.S. FDI is accounted for by tax haven affiliates of U.S. corporations. Perhaps the most extreme case are the Cayman Islands, which have the sixth largest portfolio capital inflow in the world while having a population of a medium-sized American city (Hines, 2010).

Moreover, tax havens contribute to the increasing income inequality in the world. They deliberately redistribute wealth from the world's poorest countries to the richest (Murphy, 2011). Tax havens make it viable for MNCs to shift profits out of the poor countries, where the associated activities take place, into the tax haven affiliates where the profits go largely untaxed (ActionAid, 2013). In 2012, it was estimated that illicit funds of over $900 billion flowed from developing countries to the developed world, and this movement was most likely facilitated by tax havens (Kar & Spanjers, 2014). Additionally, there exists empirical evidence indicating that profit shifting by MNCs into tax havens is more prominent in developing countries than in the developed world. This is caused by the fact that the reported profits in developing countries are much more sensitive to profit-shifting incentives (Johannesen et al., 2016). This deprives developing countries of the necessary tax revenues and further hinders their economic growth (ActionAid, 2013).

Overall, tax havens are thought to encourage "bad" behaviour in source countries such as money laundering or tax evasion (Rose & Spiegel, 2007), and to provide increased incentives for corruption (Murphy, 2011). This view is further supported by Slemrod & Wilson (2009), who present empirical evidence that elimination of a sufficiently small number of tax havens would leave all countries better off (including the remaining havens) provided they were not tax havens to begin with. They assert that partial elimination of tax havens could improve welfare in non-

haven countries because they would be able to increase the taxes, which they were forced to set inefficiently low for the sole purpose of attracting more mobile capital in the environment of fierce tax competition (Slemrod & Wilson, 2009). This would all point to a conclusion that a world without tax havens is a better world.

2.1.2 Positive effects

Nonetheless, there are always two sides to every coin. Evaluating the impact of tax haven existence on the world economy is conceptually very difficult and perhaps that is one of the reasons for the growing controversy. While there is still a widespread concern that tax havens impose significant costs on high-tax jurisdictions, several recent papers emphasized the emerging "positive" view that, under certain conditions, tax haven activity may be beneficial for high-tax countries in the nearby region.

Hines (2005) points out that tax havens are small but rapidly growing economies with the potential to have impact on economic activity of nearby countries through positive spill-overs. Tax havens often exhibit faster growth than other countries, facilitated mainly through attraction of large flows of FDI, and since they are mostly intermediaries, they can in turn induce faster growth in the nearby countries. Hines (2010) supports his earlier assertion with evidence that countries situated close to tax havens exhibit faster real income growth than those further away.

Desai et al. (2006a) contradict the popular assumption of much of the tax competition literature that tax havens divert economic activity from high-tax jurisdictions with following empirical evidence. They find that firms facing the reduced costs of using tax havens will react with expanding, rather than contracting, their foreign activities in nearby high-tax countries. Desai et al. (2004) indicate that 1% greater likelihood of owning a tax haven affiliate is correlated with up to 0.7% increase in sales and investment growth in non-haven countries within the same region. Recent study by Blanco & Rogers (2009) claims that FDI flows in developing countries are positively and significantly correlated with the proximity to the nearest tax haven and the level of FDI in this tax haven. This further supports the view that the ability to use tax haven operations does not divert economic activity from high-tax jurisdictions. In fact, tax havens can stimulate investment and growth of operations in nearby non-haven countries.

Additionally, tax havens are believed to cause increased tax competition between governments. It is more likely, however, that opportunities of tax avoidance through tax havens allow other countries to maintain relatively high capital tax rates without causing significant decrease in FDI (Hines, 2010). A similar conclusion is presented in the study by Desai et al. (2006a). The authors claim that the use of tax havens by foreign investors helps preserve the ability of high-tax jurisdictions to draw significant levels of FDI. Dharmapala (2008) argues the case that while tax havens facilitate a disproportionate part of the world's FDI, it does not necessarily mean that they leave high-tax countries worse off. He supports this assertion with empirical evidence of robustly growing corporate tax revenues in major capital-exporting countries despite large flows of FDI to tax havens. He, thus, concludes that the existence of tax havens can enhance market efficiency and even reduce tax competition. Hines & Rice (1994) also conclude that while FDI in tax havens has an ambiguous effect on U.S. tax revenue, it is possible that low foreign tax rates can ultimately enhance U.S. tax collections.

Furthermore, though increased use of tax havens may decrease the effective tax rates on tax haven users, it enables greater taxation of immobile domestic firms and thus no decline in tax revenues needs to occur (Desai, 1999). Keen (2001) asserts that in the presence of preferential tax regimes, countries can set high tax rates for the immobile capital and "compete" only over tax rates on mobile capital, thus restricting the effects of tax competition only to a subset of the tax base. This differentiation of tax systems can improve the outcomes of tax competition, from which the countries involved may benefit. Hong & Smart (2007) also find that citizens of high-tax jurisdictions benefit from international tax planning provided the tax rates are not too low. Corporate tax rates thus appear to be in no danger of "race to the bottom".

Rose & Spiegel (2007) argue that while the overall impact of tax havens on welfare of nearby non-havens is ambiguous, tax havens may have unintended positive effects on the competitiveness of the domestic banking system and the overall financial depth. They provide evidence that tax haven proximity has positive impact on financial market competition. Countries located close to tax havens exhibited less concentrated banking sector, lower interest rate spreads of commercial banks, and greater credit extension to private sector. Hines (2010) cautions, however, that the evidence on the link between tax haven proximity and financial market competition can be interpreted

in multiple ways, since countries located near well-developed financial markets may be more likely to become tax havens themselves.

As testified by these studies, the impact of tax havens on the world economy is significant. The implications of their tax policies on governments of high-tax jurisdictions are often mixed. Whether they are good or bad cannot be stated categorically and depends largely on one's personal opinion and "moral compass". And given the complexity of the issue, governments of high-tax countries are often unable to properly evaluate the net effect of nearby tax havens. Despite a very lively debate among the international community, it is unlikely that they will be able to collectively coordinate in these matters and thus succeed in persuading or forcing tax havens to abandon their practices. As a consequence, tax havens will likely continue to be an important player in the world economy (Hines, 2005).

2.2 Determinants of tax haven demand

As was pointed out earlier, the academic literature on the determinants of the demand for tax haven operations is considerably more incomplete than on the various effects of tax havens. Given the importance of this issue, it is surprising that not nearly enough attention has been given to the incentives of companies to set up tax haven operations. Tax haven use is determined by multiple independent factors ranging from country-specific factors such as different tax systems, Controlled Foreign Company (CFC) rules, bilateral tax treaties, or Tax Information Exchange Agreements; to various firm-specific factors, which are the key focus of this thesis. This section summarizes the relevant academic literature that has been dedicated to this topic up to the present.

2.2.1 Country-specific determinants

Most of the academic debate on this topic is dedicated to the link between tax haven use and different tax systems. Depending on the principle the said country follows with regard to taxation of foreign income earned by resident companies, we distinguish two different systems of foreign profit taxation: credit system and exemption system. The exemption system, also referred to as source-based tax system or territorial system, follows the capital import neutrality and thus the income generated from sources outside the country is exempt from taxation. On the other hand, the credit system, also referred to as residence-based tax system or worldwide system, follows the capital

export neutrality meaning that the country taxes income of resident companies generated from all sources worldwide. Incentives to shift profits to tax havens can be found under both systems (Markle & Robinson, 2012).

Countries seek to diminish the potential abuse by enacting CFC rules, which restrict the use of "deferral" in the case of exemption system and protect the country's tax base against profit shifting in the case of credit system. Voget (2011), however, finds that by enacting CFC rules, the country becomes less attractive as a headquarter location and MNCs parent companies will more likely seek to relocate. Additionally, the likelihood of relocation is increased, if MNCs are resident in credit system countries with CFC legislation in place and derive their profits from subsidiaries located in tax havens (meaning their profits are subjected to low taxes). Maffini (2012) investigates whether the exemption system is more vulnerable to tax avoidance. She produces evidence that tax haven use is more beneficial for MNCs resident in exemption countries, as it reduces their tax burden more relative to MNCs in credit countries. Similarly, using a comprehensive dataset, Clausing & Shaviro (2011) find conclusive evidence of credit system countries being less sensitive to foreign taxes than exemption system or hybrid system countries.

Markle & Robinson (2012) examine how the anti-abuse mechanisms used by countries in order to prevent tax base erosion – predominantly the CFC rules and taxation of foreign profits – influence the behaviour of MNCs in 28 different countries. Instead of dividing countries into groups based on whether they employ exemption or credit system for taxation of foreign income, as it was done in previous studies, they categorize countries according to the CFC rules they set in place, as these have the ability to blur the lines between those two systems. They conclude that tax haven use by MNCs decreases with the increased scope of CFC rules the parent country employs. This suggests that the variability of CFC rules across countries in fact matters and is a significant determinant of MNCs tax haven use.

On that note, few words should be said about the tax environment in the Czech Republic, as it pertains to the understanding of the general conditions under which Czech firms operate. Tax system in the Czech Republic generally imposes four types of taxes on corporations. These are corporate tax, value added tax, withholding tax, and social security contributions. Residents are taxed on worldwide income and non-residents are taxed only on income from sources located in the Czech Republic.

Therefore, the Czech Republic employs the credit system, which is sometimes called residence-based system as well.

The Czech Republic has implemented all the relevant EU directives connected to cross-border taxation: Interest and Royalty Directive (2003/49/EC), Parent-Subsidiary Directive (2011/96/EU), Merger Directive (90/434/EEC), and most recently Council Directive 2014/48/EU, which amended the Savings Directive (2003/48/EC) on the taxation of savings income in the form of interest payments. The aim of the last mentioned directive is the exchange of information about interest payments made between different EU member states and thus ensuring the interest earned is fully declared by the tax payer in his country of residence.

Currently, there is no comprehensive CFC legislation in place in the Czech Republic. One possible reason for this might be that CFCs are not considered a serious enough threat of tax base erosion in the Czech tax environment. The rationale behind this is that the income transfers between the Czech residents and their foreign counterparts, which would be influenced by the CFC legislation, are largely limited to license fees, dividends, and interest payments (Lang, 2004).

Nonetheless, there are some anti-avoidance rules and measures that attempt to prevent or at least limit the use of low-tax jurisdictions. Among these rules are mainly transfer pricing rules, thin capitalization rules, and rules for tax residency based on the concept of "place of effective management". Transfer pricing rules require the prices between related parties to adhere to the arm's length principle. No particular method is prescribed by the Czech tax law for transfer pricing, but generally the tax authorities follow the OECD guidelines. In the cases where the transfer price is not set at arm's length and the entity cannot produce any valid economic reason for doing so, the tax authorities will sanction the appropriate adjustment. Furthermore, if the company pays an above the arm's length price to a related party resident outside of the EU, the difference has to be reclassified as dividend and is then subject to the appropriate withholding tax rate. Thin capitalization rules outlay the treatment of financial costs (both interest expense and related expense) of loans from related parties. These costs are non-deductible if the debt-to-equity ratio exceeds 4:1, or if it exceeds 6:1 in the case of banks and insurance companies.

There are measures in place that aim to prevent double taxation of income in the Czech Republic as well. Double taxation relief is facilitated either by unilateral measures within the Czech tax law or by double tax treaties. The Czech Republic has a broad network of tax treaties that is being expanded continuously. Currently, there are 85 Double Tax Agreements (DTAs) and 6 Tax Information Exchange Agreements in place. For the DTAs, the Czech Republic follows the OECD Model Tax Convention in most cases, where the relief from double taxation is provided on all types of income and there is an exchange of information provision included.

In conclusion, there are some anti-avoidance rules in effect that are aimed at limiting the use of low-tax jurisdictions, such as transfer pricing rules, etc. These rules currently in place could be considered sufficient in terms of preventing tax avoidance and tax evasion, at least to some extent. In addition, the Czech Republic employs the credit system, which has been found to decrease the use of tax havens (Markle & Robinson, 2012). Nevertheless, the Czech Republic could benefit from introduction of CFC legislation, which has been shown to discourage companies from the use of tax havens as well (Markle & Robinson, 2012).

2.2.2 Firm-specific determinants

Seeing as large portion of the current literature is focused on the link between tax systems and tax haven use, the thesis will focus primarily on the link between firm-specific characteristics and the use of tax havens. Existing research on how various firm-level characteristics influence tax haven demand is mostly limited to the U.S. companies by Desai et al. (2006b) and German companies by Gumpert et al. (2011). Desai et al. (2006b) analyse data of U.S. MNCs and determine that large international firms with substantial intrafirm trade and R&D investments are more likely to use tax havens. Based on data collected from German firms, Gumpert et al. (2011) conclude that facing higher foreign tax rates corresponds with higher probability of owning tax haven affiliates. Recently, Jones & Temouri (2013) were the first to attempt comprehensive analysis of firm-specific characteristics influencing the demand for tax haven operations for companies worldwide. They empirically examine which type of firms engage in tax haven activity most often.

As evident from previous research, the firm-specific characteristics that influence the financial strategy of MNCs and their ability to exploit tax havens are

mainly firm size and profitability, the size of operations abroad, R&D intensity, and the firm leverage. Therefore, these characteristics will hold the centre of attention in the analysis of Czech companies. Let us now examine them in more detail.

So called internalization advantage explains why firms would seek to undertake FDI in foreign location instead of pursuing other activities such as exporting and licensing. In particular, internalization of a firm's tax affairs, in other words the ability to earn income in the right location (with low taxes), is easier to accomplish for large MNCs with fully owned foreign subsidiaries than if the MNC must deal with outside partner (Jones & Temouri, 2013). One has to also consider the ability of a firm to manage the newly created assets, which might be easier for large and older well-established firms. Thus, beside the firm size, sometimes firm age is used in literature as a measure of internalization advantage as well (Jones & Temouri, 2013). Large firms might also have a competitive advantage by being able to take advantage of complex structures using intra-firm debt, dividend repatriations, royalty payments, or intra-firm trade.

Existing literature considers the firm size and profitability to be the most important determinants of tax haven use (Graham & Tucker, 2006). Large MNCs with significant operations abroad will likely exhibit higher propensity to engage in tax haven use simply due to the economies of scale in using tax havens for tax avoidance purposes (Markle & Robinson, 2012). Large MNCs with strong international presence will likely have more tax planning opportunities including the use of tax havens as well (Leblang, 1998). Furthermore, Desai & Hines (2002) claim in their study of U.S. MNCs that firm size has positive impact on headquarter relocations.

According to Gumpert et al. (2011), larger companies with bigger international activities can be expected to be more productive, relative to their smaller counterparts, and thus more likely to be able to overcome the fixed and variable costs of setting up tax haven operations and subsequent income reallocation. Desai et al. (2006b) find similar evidence in a dataset of U.S. MNCs, saying that firms with larger foreign operations are more likely to own tax haven affiliates. These empirically supported assertions lead to the first hypothesis:

Hypothesis 1: Large and profitable companies with large international activities are more likely to engage in tax haven operations.

The first hypothesis is very broad and applies to all types of companies. But can these arguments be made for all firms in general? Or does only a certain type of firms engage in tax haven activity? According to Jones & Temouri (2013), technologically intensive firms with large intangible assets are more adept at using tax haven strategies. The financial ownership advantage is achieved through an aggressive tax avoidance strategy, which may provide advantages to the firm over its domestic or foreign rivals. As a result, firms often transplant rights, trademarks, patents, licenses, or sub-licenses to low-tax jurisdictions so as to receive the payments from these intangible assets from related companies located in low-tax countries.

Desai et al. (2006b) present empirical evidence from the analysis of U.S. companies that MNCs with higher R&D intensity are more likely than others to own a tax haven affiliate. They again point out the relative ease with which firms can relocate the income produced by intangible property. Graham & Tucker (2006) support these findings as well, stipulating that firms with higher R&D intensity tend to engage more often in tax avoidance using corporate tax shelters. Markle & Robinson (2012) also predict technology intensive MNCs to be able to benefit more from tax haven use, as their sources of income are more mobile. Besides higher degree of income mobility, a prominent role of intangible assets can thus cause firms to exhibit lower taxes on foreign profits (Voget, 2011). Furthermore, Grubert (2003) finds that approximately half of the income shifted from high-tax to low-tax jurisdictions is income derived from R&D based intangibles.

Gumpert et al. (2011) argue further that firms with more R&D activities and thus larger intangible assets are able to reallocate their income more easily. Thanks to the lack of comparable market transactions, a firm with larger intangible assets would have greater discretion in choosing transfer prices. Additionally, the variable costs of tax haven use, which can influence the propensity of firms to engage in tax haven activities, are affected by certain firm-specific characteristics such as R&D intensity. License arrangements, royalty payments, and the location of intangible assets all influence the costs of tax haven use and have been used as a tool of easier income reallocation. These facts lead to the second hypothesis:

Hypothesis 2: High R&D intensity increases the propensity of a company to use tax haven operations.

Additionally, Gumpert et al. (2011) separate the firms in their analysis into two groups – manufacturing and service firms – according to the NACE Rev.2 codes, where manufacturing firms were found to have systematically larger R&D intensity than service firms. They assert that manufacturing firms that rely more heavily on intangible assets face lower variable costs of income reallocation than service firms because the returns to intangible property are more readily reallocated for tax purposes. Manufacturing firms are therefore more likely to use tax havens, while service firms (despite facing lower fixed costs of tax haven investment) encounter high marginal costs of reallocating profits or lower variability of these costs.

Now let us move to the last firm-specific characteristic that will be studied in the thesis – indebtedness. The relationship between firm indebtedness and the use of tax haven operations is not yet very well explored. While a link between corporate debt ratios and tax haven activities most likely exists, the empirical evidence on the effect is inconsistent and often contradictive.

In the study conducted on a dataset of U.S. MNCs, Desai & Hines (2002) find high leverage having positive effect on headquarter relocations. They attributed these findings to the necessity of U.S. MNCs to allocate part of their interest costs against income from foreign sources. Hines (2010) claims that use of tax haven intermediaries by MNCs is attractive due tax deductibility of interest payments. Especially MNCs that choose to finance their FDI by large amounts of debt rather than by issuing equity will benefit from this feature. This reasoning points to a conclusion that higher leverage should increase the propensity of a firm to use tax havens. Additionally, Egger et al. (2010) find that foreign-owned firms have systematically higher debt ratios than their domestically-owned counterparts, and this difference is more pronounced in countries with higher corporate tax rate.

On the other hand, Graham & Tucker (2006) claim that tax shelters can be used as a substitute for corporate debt. Rather than saying that firms use tax shelters for the purpose of reducing their debt, they assert that when a firm engages in tax sheltering, it is likely to use less debt financing. They find that tax shelter firms have systematically lower debt ratios and thus use less debt than non-shelter firms. That is consistent with the assumption that tax shelters are equivalent to a non-debt tax shield that substitutes for the tax deductibility of interest payments. The authors also stress the difficulty of proving the direction of causality and caution the readers to interpret

their results as proof of correlation only, not causality. Furthermore, Jones & Temouri (2013) find empirical evidence on worldwide dataset of MNCs that firms with higher long-term debt are less likely to invest in tax havens. This would suggest that tax haven use could decrease the cost of capital (Oxelheim et al., 1998), thus decreasing the incentive of debt financing.

It is apparent that the evidence on the influence of company's indebtedness on the propensity to use tax havens is inconclusive and very much open to interpretation. Based on our judgment, we expect there to be a negative relationship between the firm leverage and the demand for tax haven operations. Therefore, the third hypothesis is formulated as follows:

Hypothesis 3: Lower firm indebtedness is connected with higher use of tax haven operations.

3 Data description

This section describes the originally collected data and its source, and the necessary modifications and transformations performed to create the final dataset used in the empirical part of the thesis. This section also outlays the theoretical groundwork for the construction of the dependent variable, which is whether the company is a tax haven user or not, and defines the independent variables used subsequently in the analysis.

3.1 Description of collected data

The thesis utilizes data from the Amadeus database. It is a subset of the ORBIS database created by Bureau van Dijk. It contains comparable financial and accounting information on over 20 million private and public companies across the whole Europe. The database provides multiple years of data, and it contains information about the ownership structure of the companies and the links to parent companies and subsidiaries as well. This information is crucial for the desired analysis, as it allows us to identify which companies are tax haven users.

Only the subset including Czech companies and MNCs with a subsidiary in the Czech Republic was considered. It contains 67,636 companies, 1,507 of which have either direct or indirect links to tax havens (1,981 if the Netherlands is considered to be a tax haven). Only very large, large, and medium companies (as defined by Bureau van Dijk) were studied in this analysis. The reason for exclusion of small companies is the extent of missing accounting data of these companies. For most of the small companies, the only data available was company name, city, date of incorporation, NACE Rev.2 code, and very limited number of accounting indicators (more times than not they were missing altogether).

The sample of 67,636 Czech companies contains 720 very large, 7,737 large, and 59,179 medium companies. Each category is characterized by a set of inclusion criteria, which are summarized in the table below. For a company to be considered as belonging to a category, it has to match at least one of the following conditions summarized in Table 3.1.

Table 3.1: Inclusion criteria for size categories

	Operating revenue	Total assets	Employees	Other	Capital
Very large	≥ 100 mil EUR	≥ 200 mil EUR	≥ 1,000	Listed	≥ 5 mil EUR
Large	≥ 10 mil EUR	≥ 20 mil EUR	≥ 150		≥ 0.5 mil EUR
Medium	≥ 1 mil EUR	≥ 2 mil EUR	≥ 15		≥ 0.05 mil EUR

Source: Amadeus database

Company is considered small in the Amadeus database, if it is not included in any of the above categories.

Overwhelming majority of the sample is represented by limited liability companies, namely 41,325 of them. The rest of the sample is comprised of 7,867 joint stock companies, 160 limited partnerships, 188 public commercial companies, 487 public benefit corporations, 40 state companies, 1,598 local councils, 1,331 cooperative companies, 159 educational institutions, 4,771 entrepreneurs, 196 European companies, 259 governmental organizations, 8,067 local government units or organizations, 73 public research institutions, 216 religious institutions, 460 societies, 124 trade unions, and various others.

It should also be noted that only information from years 2010 through 2014 was collected. The database contains data as far as year 2005, but the data on Czech firms from earlier than 2010 was almost non-existent. Unfortunately, the amount of data on Czech companies available in the database varies very severely for the individual years even in the period from 2010 to 2014. Thus, the dataset is not suitable for panel data analysis. As a consequence, we performed the estimation only for the one year for which there was the largest number of observations: year 2013. After having briefly described the data that was collected from the Amadeus database, we can now proceed with the data adjustment and modification that will eventually lead to the final dataset that was used in the empirical part of the thesis.

3.2 Classifying tax havens

First crucial step in the data analysis is the identification of tax haven users. In order to be able to do so, we have to classify the countries that will be considered tax havens for the purposes of this thesis. To define as to what constitutes a tax haven is by no means easy. The definition of the term tax haven is very ambiguous. Furthermore, the

definitions already in place differ substantially and the terminology is often confused by the usage of alternative names such as offshore financial centre or secrecy jurisdiction. OECD (1998) defines a tax haven as a jurisdiction with: low or no nominal taxes, regulatory environment which prevents effective exchange of relevant information with other governments, and lack of transparency. Zoromé (2007) identifies an offshore financial centre as: being primarily focused on business towards non-residents, having favourable regulatory environment (low supervision and information disclosure obligations), and having low- or zero-taxation schemes. Financial Stability Forum (2000) defines the offshore financial centres more broadly, adding such criteria as: easy incorporation, and flexible use of trusts and special purpose vehicles. Therefore, the key characteristic of a tax haven is the fact that it offers very low or zero rates of taxation to non-residents.

The ambiguity of the term tax haven is the primary reason why there is no consensus among economists as to what countries should appear on the so called tax haven list. Over the last few decades, there have been many tax haven lists compiled by both academics and regulatory agencies. The composition of these lists differs quite substantially and some of them include as much as 70 jurisdictions. Yet, some countries appear in almost all of them. Countries such as the Bahamas, Bermuda, the Cayman Islands, Cyprus, Malta, Panama, or Lichtenstein are featured as tax havens on virtually all of the lists. Thus, it appears that researchers and practitioners are able to agree at least on some of the countries.

To classify a list of tax havens for the purposes of the thesis, we will use the approach by Murphy (2009b). He employs a number of different tax haven lists – all constructed according to a slightly different definition – and then chooses the set of countries that appear most often on these lists and thus are most likely to have the status of a tax haven. Murphy (2009b) uses eleven lists either extracted from academic literature (Hines & Rice, 1994; Zoromé, 2007) or compiled by various institutions (OECD, IMF, FSF, TJN, etc.) to find the countries that are most often classified as tax havens. The complete list based on Murphy (2009b) is quite extensive, but for the purposes of this thesis we have chosen only tax the havens that appeared on at least 7 of the lists. Those 36 tax havens can be seen in the list presented in Table 3.2. We will then arrive at our final list of tax havens by making a few adjustments.

Table 3.2: List of tax haven countries

#	Location	Int. Bureau of Fisc. Docs 1977	Irish 1982	Hines & Rice 1994	OECD 2000	IMF 2000	FSF 2000	FATF 2000-02	TJN 2005	IMF 2007	STHA A/Levin 2007	Low-TaxNet 2008	Total
1	Bahamas	1	1	1	1	1	1	1	1	1	1	1	11
2	Bermuda	1	1	1	1	1	1	1	1	1	1	1	11
3	Cayman Islands	1	1	1	1	1	1	1	1	1	1	1	11
4	Guernsey	1	1	1	1	1	1	1	1	1	1	1	11
5	Jersey	1	1	1	1	1	1	1	1	1	1	1	11
6	Malta	1	1	1	1	1	1	1	1	1	1	1	11
7	Panama	1	1	1	1	1	1	1	1	1	1	1	11
8	Barbados	1	1	1	1	1	1		1	1	1	1	10
9	British Virgin Islands	1	1	1	1	1	1	1	1		1	1	10
10	Cyprus	1		1	1	1	1	1	1	1	1	1	10
11	Isle of Man	1		1	1	1	1	1	1	1	1	1	10
12	Lichtenstein	1	1	1	1	1	1	1	1		1	1	10
13	Netherlands Antilles	1	1	1	1	1	1		1	1	1	1	10
14	Vanuatu	1	1	1	1	1	1		1	1	1	1	10
15	Gibraltar	1		1	1	1	1	1	1		1	1	9
16	Hong Kong	1	1	1		1	1		1	1	1	1	9
17	Singapore	1	1	1		1	1		1	1	1	1	9
18	St. Vincent & Grenadines	1		1	1	1	1	1	1		1	1	9
19	Switzerland	1	1	1		1	1		1	1	1	1	9
20	Turks & Caicos Islands	1	1	1	1	1	1		1		1	1	9
21	Antigua & Barbuda	1		1	1	1	1	1	1		1		8
22	Belize			1	1	1	1	1	1		1	1	8
23	Cook Islands			1	1	1	1	1	1		1	1	8
24	Grenada	1		1	1	1		1	1		1	1	8
25	Ireland	1	1	1		1	1		1	1		1	8
26	Luxemburg	1		1		1	1		1	1	1	1	8
27	Monaco	1		1	1	1	1	1	1			1	8
28	Nauru	1	1		1	1	1	1	1		1		8
29	St. Kitts & Nevis			1	1	1	1	1	1		1	1	8
30	Andorra	1		1	1	1	1		1			1	7
31	Anguilla			1	1	1	1		1		1	1	7
32	Bahrain		1	1	1	1	1		1	1			7
33	Costa Rica	1	1			1	1		1		1	1	7
34	Marshall Islands			1	1	1	1	1	1			1	7
35	Mauritius				1	1	1	1	1	1		1	7
36	St. Lucia			1	1	1	1	1	1		1		7

Source: Murphy (2009b)

When compared with the list used by the Czech Capital Information Agency, the most notable absence would be that of the Netherlands, the Seychelles, and the USA. In the comparison by Murphy (2009b), both the Netherlands and the USA were included only in two of the eleven lists. And yet, the Netherlands is considered as tax haven by many other academics and there is indeed empirical evidence supporting this view (Weyzig, 2012). Even though the corporate taxes are relatively high, the Netherlands deliberately offers companies various means to reduce their taxation charges, especially on royalties, interest, dividends, and capital gains from subsidiaries. In this way, the Netherlands attracts companies that would otherwise not choose residency there. The companies can then further benefit from the rather extensive double taxation treaty network that the Netherlands has in place (Van Dijk et al., 2006). Moreover, the Netherlands is very sought after by Czech companies to set up tax haven operations. According to Bisnode (2015), approximately one third of all Czech companies that use tax havens chooses the Netherlands. The presence of company links to the Netherlands is not nearly as overwhelming in the obtained sample. The count of companies with such a link does not exceed 500 among the very large, large, and medium companies. Yet, the number is quite significant and should be considered in the analysis. Therefore, we will present the results of the empirical analysis both for the list of tax havens including and excluding the Netherlands.

The United States offer favourable conditions for non-resident companies comparable to offshore jurisdictions only in certain states and even then, the company must satisfy a number of criteria to receive these benefits. Delaware is an example of such a state. The very lax corporate tax laws including the rules of incorporation of new companies have made it very easy to use Delaware shell corporations as a tool of international tax avoidance. As a result, there are more corporate entities resident in the state than is the state's actual population (Schneider et al., 2013). Even though the number of Czech companies with links to the United States is quite large (635 companies), the ultimate number of companies that use their links to the United States for tax haven purposes is unknown. This would require further detailed analysis of the companies in question. The assumption here is that the resulting number would be quite low and therefore not fundamental to the analysis. Therefore, the United States will not be considered a tax haven for the purposes of this thesis.

The Seychelles were included in six tax haven lists examined by Murphy (2009b), which means they would not make the list by only one "point". For the purposes of this thesis, however, the Seychelles have been included in the list of tax havens. The main reason being that the Seychelles are increasingly popular as tax haven among Czech companies and the number of companies using the Seychelles for their tax haven operations has approximately tripled over the last five years (Bisnode, 2015). Additionally, the Seychelles offer favourable tax environment to offshore companies. International business companies are exempt from corporate tax, withholding tax, and Stamp duty. Special license companies are subject to a corporate tax of only 1.5% (OECD, 2011). The Seychelles offer very strong confidentiality and privacy to offshore companies as well. Firms are not required to publish any financial or accounting records, as these are strictly private. When we take all these facts into consideration, including the Seychelles among tax havens is a reasonable choice.

The resulting list then contains 38 tax havens – 36 tax havens adopted from Murphy (2009b) complemented by the Netherlands and the Seychelles. The final list labels 1,507 Czech companies as having a link to tax haven (1,981 if the Netherlands is included). Majority of these companies is linked to one of the following tax havens: the Netherlands, Cyprus, Switzerland, or Luxembourg. We realize that the choice of such a list is quite arbitrary. Nevertheless, we believe that by adjusting the general list of tax havens to fit the specifics of the case of the Czech Republic, the resulting list is best suited for the analysis of Czech firms' behaviour.

3.3 Identifying tax haven users

In determining whether a company is a tax haven user or not, we consider both direct and indirect links to tax havens, where a direct link is a connection to a tax haven through the company's subsidiary, and an indirect link means a connection to a tax haven through the company's parent ownership structure. The database contains some information about subsidiaries and parent companies as well. This data is largely limited, but it includes information on location of these companies, which we utilize here. Therefore, we examine both the subsidiaries of each company and the global ultimate owner (GUO) of the company. In the database, a company is defined as GUO, if all the links found in the path from the subject company to its ultimate owner have a minimum percentage of 50.01%. Then, if either the subsidiary or the GUO is located

in a jurisdiction classified as tax haven, the company is labelled as tax haven user. This allows for the definition of the dependent variable $TaxHavenUser$ which takes the value of one if the company is a tax haven user, and zero otherwise.

There is a very pronounced asymmetry present between the amount of direct and indirect links to tax havens in the dataset. Only 36 companies (68, if the Netherlands is considered to be a tax haven) in the whole dataset have a subsidiary located in one of the tax havens. The overwhelming majority of tax haven links is represented by the indirect link, meaning through the ownership structure. The indirect links account for more than 95% of all tax haven links.

The following Table 3.3 summarizes the distribution of tax haven users among individual countries in the originally collected data.

Table 3.3: Distribution of tax haven links

Country	Number of tax haven links
the Netherlands	474
Cyprus	405
Switzerland	369
Luxembourg	361
Others	372
Total (including the Netherlands):	1,507
Total (excluding the Netherlands):	1,981

Source: Author's computations

As was mentioned earlier, complete majority of tax haven links – namely 1,609 – is present with one of these four countries: the Netherlands, Cyprus, Switzerland, and Luxembourg. The 34 remaining tax havens from the final list only account for 372 of all tax haven links. As is apparent from this information, the distribution of the links among the individual countries is very disproportionate. Together with the fact that the four mentioned tax havens cannot be considered a homogenous group and tend to attract different type of companies using different incentives, this warrants our analysis to be conducted separately for each of the four major tax havens as well. Only that way will we be able to capture the heterogeneity in the demand for setting up tax haven operations in specific tax haven countries.

3.4 Firm-specific characteristics

We obtained from the database accounting data available on each firm including measures such as: operating revenue, total assets, net income, shareholders' funds, cash flow, long-term debt, intangible assets, and sales, as well as information on the firm age, number of employees, NACE Rev.2 code, number of companies in the corporate group, and number of subsidiaries. We then transformed these measures into the desired variables that are used later in the estimation. As was mentioned above, the availability of some accounting information on Czech firms was very low, due to which we had to restrict the sample used in the final analysis. All of the financial indicators in the database were reported in thousands of Euros. The units, however, were inconsequential to the analysis since all the numbers were transformed either into a ratio or into natural logarithm form.

The key financial indicators that we will use in the analysis are total assets of the firm, which will be used in the natural logarithm form and are the indicator of firm size. The same transformation will be used for the number of employees of the firm, which is an additional measure of the firm size, and number of companies in the corporate group, which is a proxy for the internationality of the firm. We utilize the information on the firm age as well, both in its linear and quadratic form, in order to determine whether older well-established firms are more likely to use tax havens due to being able to fully make use of the internalization advantage (Jones & Temouri, 2013). The rationale behind including the second order term of the Age variable is that there is a turning point defined in this relationship in previous research, such as in the study by Hennart & Park (1993).

We have considered several alternative measures for the firm size and internationality as well. We have, however, decided against these measures, as they did not perform well in the estimation. Cash flow and sales were both viable options for the size measure. Quite predictably, they were both highly correlated with total assets and thus only one of the three variables could be used in the analysis without jeopardizing the soundness of the estimation results. Consequently, we have chosen the total assets as the preferable option for the measure of size. Alternative measure for the internationality could be the number of subsidiaries of the company. But as we asserted above, the majority of the tax haven links were represented by the indirect

links, meaning through the ownership structure. Consequently, this variable would not be very good indicator of the links that are present in the dataset. Thus, we have settled on the number of companies in the corporate group instead.

Some of the accounting data were used in order to create new independent variables that would be needed further along in the analysis. To test for correctness of Hypothesis 3, we had to derive an indicator of the firm indebtedness, and to test for a part of Hypothesis 1, we had to define a measure of the firm's profitability. The newly created variables were:

- Debt-to-assets ratio which is calculated as: $debt\ ratio = \frac{total\ assets - equity}{total\ assets}$ and is a measure of a firm's indebtedness.
- Profitability which is calculated as: $profitability = \frac{profit\ before\ tax}{total\ assets}$ and is an indicator of a firm's profitability.

Several other measures for indebtedness and profitability with different numerators were explored, such as $net\ income$ or $operating\ revenues$ for the profitability measure, and $longterm\ debt$ or $(longterm\ debt + loans)$ for the measure of indebtedness. Additionally, we considered long-term debt in the natural logarithm form as the measure of indebtedness as well. Those defined above, however, have proven to perform best in the estimation, and furthermore, they did not restrict the dataset any further.

Additionally, due to the low availability of the information on intangible assets and R&D expenditure, we used the NACE Rev.2 codes on 2-digit level to generate a set of sectoral dummy variables to distinguish between different R&D intensity levels. The process is described in the following Section 3.5.

3.5 Measuring R&D intensity

The information on R&D expenses and intangible assets of Czech companies is very scarce and the data was largely missing in the dataset. As a result, we had to use a different approach to measure the effect of R&D intensity on the propensity of a firm to use tax haven operations. In the thesis, we use an approach of aggregating individual industries and service activities into broader groups based on their different levels of

technological intensity. To distinguish between the different sectors, we use the NACE Rev.2 2-digit codes and the Eurostat defined categories in order to aggregate the industries. This approach is inspired by the study by Jones & Temouri (2013).

Eurostat (2015) compiles the "Statistics on high-tech industry and knowledge-intensive services", where manufacturing and service activities are described and grouped on the basis of their technological intensity. There are three possible approaches – sectoral, product, and patent approach. We will concentrate only on the sectoral one. The sectoral approach aggregates the manufacturing industries according the level of their technological intensity into groups using the Statistical Classification of Economic Activities in the European Community (NACE) Rev.2 on the 2-digit level. The technological intensity is expressed as R&D expenditures/value added. The resulting groups of manufacturing activities then are: high-technology, medium high-technology, medium low-technology and low-technology; where high-technology manufacturing is the most R&D intensive and low-technology manufacturing is the least R&D intensive group.

Service activities are grouped together according to a similar logic, again based on the 2-digit level of NACE Rev.2 codes. The resulting two groups are knowledge intensive services and less-knowledge intensive services, where the former group is considered to be the more R&D intensive one (Eurostat, 2014). Table 3.4 provides the overview of classification of industries and services into groups based on their NACE Rev.2 codes.

Table 3.4: Eurostat aggregated groups based on NACE Rev.2 2-digit level

Group	**NACE Rev.2 2-digit level**
High-technology manufacturing	21, 26
Medium high-technology manufacturing	20, 27, 28, 29, 30
Medium low-technology manufacturing	19, 22, 23, 24, 25, 33
Low-technology manufacturing	10, 11, 12, 13, 14, 15, 16, 17, 18, 31, 32
Knowledge intensive services	50, 51, 58, 59, 60, 61, 62, 63, 64, 65, 66, 69, 70, 71, 72, 73, 74, 75, 78, 80, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93
Less-knowledge intensive services	45, 46, 47, 49, 52, 53, 55, 56, 68, 77, 79, 81, 82, 94, 95, 96, 97, 98, 99

Source: Eurostat (2015, 2014)

Just to point out a few examples, high-technology manufacturing group contains manufacturing of computer, electronic and optical product, and manufacturing of basic pharmaceutical products and preparations. These two industries are both clearly very R&D intensive and require a lot of expenditures on research and innovations. On the other hand, the less-knowledge intensive services group includes services such as: wholesale trade, retail, transport, accommodation, food and beverage services, real estate activities, rental and leasing activities, and other types of services. The services in this group have very low need of intensive R&D expenditures.

The remaining industries that were not included in either of aforementioned groups were industries such as agriculture, forestry, and fishing; mining and quarrying; electricity, gas, steam, and air-conditioning supply; water supply, sewerage, waste management, and remediation activities; and construction. These industries were considered the control group in the analysis.

As there might not be enough heterogeneity among the individual sectors, it is sensible to perform the estimation for two more general groups as well – manufacturing and service provision. For this purpose, we created two dummy variables that aggregate all companies whose core business can be described as either manufacturing or service provision. Thus, the new $Manufacturing$ dummy variable will aggregate all high technology, medium-high technology, medium-low technology, and low technology manufacturing firms, and the new $Service$ dummy variable will group together the knowledge intensive service and less-knowledge intensive service firms. The control group will remain the same.

3.6 Overview of used variables and descriptive statistics

Finally, in the estimation we employ only a smaller subset of data on Czech companies from the database. We have chosen to restrict the dataset due to the low availability of data. As was noted earlier in Sections 3.1 and 3.4, especially the accounting data on Czech companies in the Amadeus database is very incomplete, and the financial indicators that would be needed to conduct the analysis are often missing. Therefore, in the end we restricted the dataset only to year 2013, for which there was the largest

number of observations in the data. Also, in the final analysis we used only a limited sample of 15,530 companies that contained all the necessary information.

In order to ease the reader's orientation in the empirical part of the thesis and the understanding of the final dataset, we provide an overview of all variables used in the estimations. Table 3.5 presents the summary of notation and brief description of each variable that has been used in the empirical part of the thesis.

Table 3.5: Overview of variables used in the analysis

Variable notation	Variable description
Tax haven user	Dependent variable indicating that firm is a tax haven user
Age	Age of the company from its incorporation to the present day in years
Age^2	Age of the company squared
Ln assets	Natural logarithm of the total assets
Ln profitability	Natural logarithm of the profitability measure
Ln debt ratio	Natural logarithm of the debt-to-asset ratio
Ln no. of employees	Natural logarithm of the number of employees
Ln no. of comp. in cg	Natural logarithm of the number of companies in the corporate group
High technology	Dummy variable indicating that firm's core business is categorized as high technology manufacturing
Medium-high technology	Dummy variable indicating that firm's core business is categorized as medium-high technology manufacturing
Medium-low technology	Dummy variable indicating that firm's core business is categorized as medium-low technology manufacturing
Low technology	Dummy variable indicating that firm's core business is categorized as low technology manufacturing
Knowledge intensive services	Dummy variable indicating that firm's core business is categorized as knowledge intensive service
Less-knowledge intensive services	Dummy variable indicating that firm's core business is categorized as less-knowledge intensive service
Manufacturing	Dummy variable indicating that firm's core business is manufacturing
Service	Dummy variable indicating that firm's core business is service provision

Source: Author

Now we continue the data analysis with deeper description of the individual variables. The following Table 3.6 provides descriptive statistics for each of the variables that was used in the estimation. It contains standard deviation, mean, the maximum and the minimum value, and the p-value of the Shapiro-Wilk W test for normality for each variable.

Table 3.6: Descriptive statistics

Variable notation	Mean	Standard deviation	Minimum value	Maximum value	Shapiro-Wilk test
Tax haven user	0.0486	0.2149	0	1	
Age	15.3775	6.4537	2	64	<0.01
Age^2	278.1157	201.0871	4	4,096	<0.01
Ln assets	7.4322	1.6683	0.6931	16.9669	<0.01
Ln profitability	1.6689	1.3927	-5.6106	6.0785	<0.01
Ln debt ratio	3.7331	0.8401	-3.5814	7.3029	<0.01
Ln no. of employees	3.3534	1.3693	1.0986	9.2103	<0.01
Ln no. of comp. in cg	1.5322	1.5404	0.6931	8.9219	<0.01
High technology	0.0100	0.0994	0	1	
Medium-high technology	0.0766	0.2659	0	1	
Medium-low technology	0.1110	0.3142	0	1	
Low technology	0.0685	0.2526	0	1	
Knowledge intensive services	0.1677	0.3736	0	1	
Less-knowledge intensive services	0.3952	0.4889	0	1	
Manufacturing	0.2661	0.4419	0	1	
Service	0.5628	0.4961	0	1	

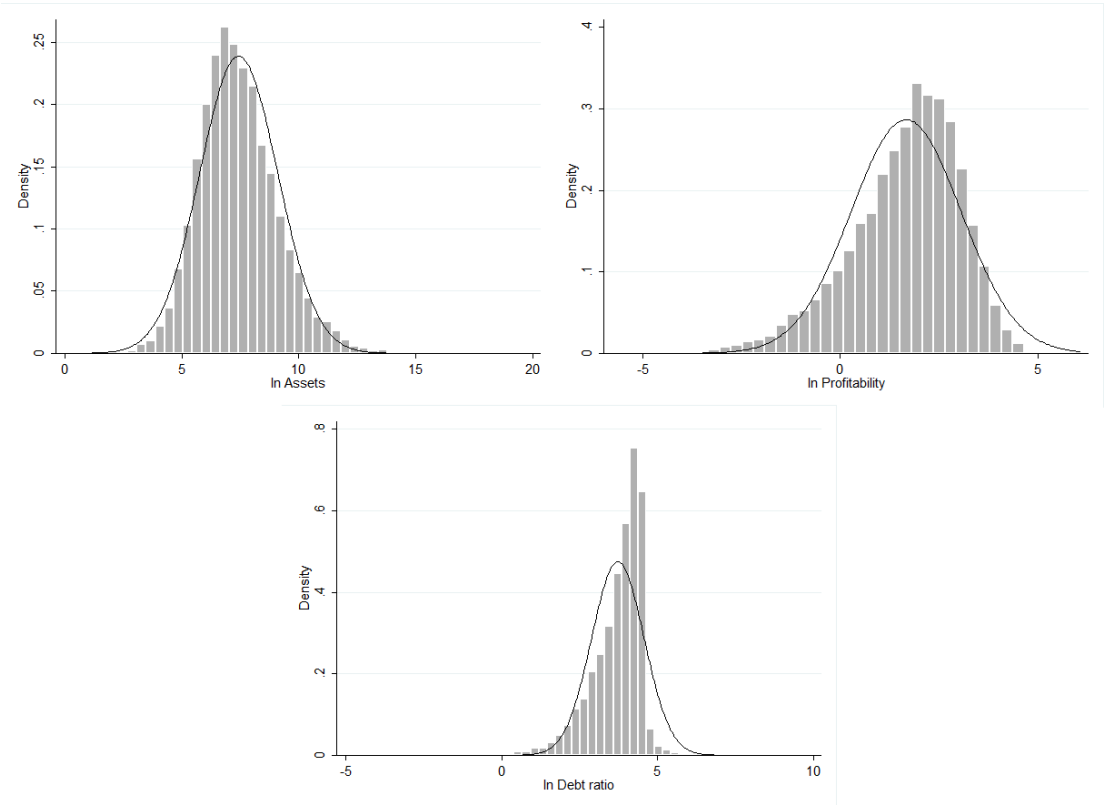
Source: Author's computations

As is apparent from the last column of the table, which contains the p-values of the Shapiro-Wilk W test for normality, none of the variables are normally distributed, as the reported p-values are lower than 0.01 and thus the null hypothesis of normality is rejected in all cases. The p-values of the Shapiro-Wilk test were not reported for the binary variables, as they are inherently non-normal. It is also worth noting that the standard deviations of a lot of the variables are quite large compared to the mean values. For instance, the standard deviation of Age is approximately 42% of its mean value. Similarly, the standard deviations of $Ln\ assets$ and $Ln\ debt\ ratio$ are approximately 22.5% of their respective mean values. This means that there is a great

amount of variation and dispersion present in the data. The values of these variables are quite widely spread around the mean.

Figure 3.1 depicts the histograms of three financial indicator variables: $Ln\ assets$, $Ln\ profitability$, and $Ln\ debt\ ratio$. In each graph, there is a plot of the probability density of the respective variable as well as the normal probability density for comparison. The conclusion of non-normality of these variables is, thus, further supported by the shape of the histograms that do not resemble the normal distribution. The variable $Ln\ assets$ is positively skewed (with skewness value 0.5035), while $Ln\ profitability$ and $Ln\ debt\ ratio$ are both negatively skewed (skewness values are -0.7561 and -1.5449 respectively). Distributions of all three variables show a prominent peak, and the excess kurtosis values are well above three.

Figure 3.1: Histograms of selected variables



Source: Author's computations

As in any other econometric model, severe multicollinearity among independent variables could jeopardize the reliability of the estimated coefficients. Thus, we tested the dataset for the occurrence of multicollinearity as well. The pairwise correlations among the explanatory variables were not very high. Except for very high

correlation between Age and Age^2 (0.9662), which is self-explanatory, the values did not exceed 0.55 between variables that would be used in the same regression. To conclude, we do not consider the threat of multicollinearity in the estimations to be serious. For the complete set of reported values of the pairwise correlations refer to Table A1. The table contains the correlation matrix of all the independent variables and can be found in the Appendix.

4 Methodology

Having described the dataset that will be used, we are now able to proceed with the empirical part. This section explains the methodology used throughout the thesis in more detail. First, we describe the applied econometric model we have chosen to use in the empirical part of the thesis. Second, we provide the description of the particular logit model we estimated as well as the different specifications used to verify the correctness of individual hypotheses posed in Section 2.

4.1 Applied econometrics

The usual and most widely used econometric methods such as ordinary least squares are suitable for a continuous dependent variable only. The thesis, however, is dealing with analysis of a qualitative response, or in other words with a discrete dependent variable, and so it makes little sense to attempt to treat it as continuous. Provided that the dependent variable in the analysis is a type of limited dependent variable, whose range of values is severely restricted, we had to choose the applied econometric method accordingly.

Having a discrete dependent variable in itself does not mean the use of linear models is out of the question. However, the linear probability model (LPM), which is a viable candidate for estimation of a binary response, has certain drawbacks that make it the less appropriate option. One of the most important disadvantages being that the fitted probabilities can assume values larger than one or even be negative. Additionally, the marginal effect of any independent variable is constant. These shortcomings of LPM can be overcome by the use of more sophisticated non-linear models. Therefore, we turn our attention to the limited dependent variable models family, more specifically to the binary choice models, which allow the dependent variable to only assume two distinctive values – one or zero.

In a binary response model, the key focus lies on the response probability, which is non-linear in the set of parameters $\widehat{\beta_k}$ (in order to overcome the limitations of

LPM). Let us consider a generalized binary response model that can be expressed by the following equation:

$$Prob(y = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k) = G(\beta_0 + \boldsymbol{x}'\boldsymbol{\beta})$$

where $\boldsymbol{x}$ is a full set of explanatory variables, $\beta_0, \ldots, \beta_k$ are the parameters to be estimated, and G represents a function which can only take on values between zero and one for all real numbers z; that is $\forall_{z \in R}: 0 < G(z) < 1$. This key assumption ensures that the response probability will be strictly between one and zero (Wooldridge, 2009). To satisfy this condition, many non-linear functions have been suggested. There are two, however, that are used in the vast majority of econometric applications.

In the logit model, G is the cumulative distribution function for a standard logistic random variable, which can be expressed in the following way:

$$G(z) = \frac{exp(z)}{1 + exp(z)} = \Lambda(z)$$

In the probit model, G is the standard normal cumulative distribution function that has the following integral form:

$$G(z) = \Phi(z) = \int_{-\infty}^{z} \phi(v) dv$$

where $\phi(z)$ denotes the standard normal density and that is defined as:

$$\phi(z) = (2\pi)^{-\frac{1}{2}} \cdot exp\left(-\frac{z^2}{2}\right)$$

The choice of G in both cases ensures the response probability assumes values strictly between zero and one for all values of the parameters β_k and for all values of the explanatory variables x_k. That can be simply verified by computing limits of the functions at $\pm\infty$. It is apparent from the equations above that for both functions it holds: $G(z) \to 1$ for $z \to \infty$, and $G(z) \to 0$ for $z \to -\infty$. Furthermore, both functions are increasing in z and they increase most quickly at $z = 0$. Their shapes are, thus, very similar except for the tails that are considerably heavier for the logistic distribution. Consequently, it is difficult to justify the choice of one distribution over the other solely on theoretical grounds (Greene, 2012).

The thesis will follow the approach used in several recent studies dedicated to demand for tax haven operations, most notably by Markle & Robinson (2012), Voget (2011), and Desai et al. (2006b), who all choose logistic regression in favour of probit regression. As was mentioned above, there is no empirical evidence that would justify the use of logistic over probit regression in one case or another. Both models tend to give very similar probabilities, especially for the intermediate values of $\boldsymbol{x}'\boldsymbol{\beta}$. Thus, they are often both included in the estimation, their results are reported side by side, and then interpreted in comparison to one another. This is true except in the case when the sample contains very few "responses" ($y = 1$), and there is very wide variation in one of the crucial explanatory variables. Greene (2012) cautions that in this situation probit and logit models can produce very different predictions, and it was suggested in recent literature that logit might be the more appropriate choice here. As we established earlier, the distribution of outcomes between 0 and 1 is very disproportionate in the sample, there are much more "non-responses" (firm is not a tax haven user) than "responses" (firm is a tax haven user). Therefore, our choice of the logit model for the estimations is justified.

4.2 Model specification

In the empirical part of the thesis we will estimate different specifications of the following cross-sectional logistic regression:

$$TaxHavenUser_i = \beta_0 + \sum_{k=1}^{s} \beta_k Firm\ specific\ characteristic_i + \sum_{l=1}^{t} \gamma_l Sector\ dummy_i + \varepsilon_i$$

In the equation, $\beta_{0,}\beta_k$, and γ_l are the coefficients to be estimated and ε_i is the disturbance term. $TaxHavenUser$ is the dependent variable in the logit regression. It equals one if the company's ultimate owner is located in a country classified as tax haven, or if the company owns a subsidiary located in a country classified as tax haven, and zero otherwise. This binary variable is taken as a representation of latent variable describing the true propensity of a firm to use tax haven operations. The vector $Firm\ specific\ characteristic$ contains the following variables:

- Age
- Age^2
- $Ln\ assets$
- $Ln\ debt\ ratio$
- $Ln\ profitability$
- $Ln\ no.of\ comp.in\ cg$
- $Ln\ no.of\ employees$

The vector $Sector\ dummy$ includes sector-specific dummy variables based on the sectoral aggregation approach proposed by Eurostat, as was explained in Section 3.5. The sector-specific dummy variables employed in the analysis are:

- $High\ technology$,
- $Medium\ high\ technology$,
- $Medium\ low\ technology$,
- $Low\ technology$,
- $Knowledge\ intensive\ services$, and
- $Less\ knowledge\ intensive\ services$,

or only two further aggregated groups:

- $Manufacturing$, and
- $Service$.

The industries or services not included in any of the above mentioned groups served as the control group in the estimation.

As was stated earlier, we will estimate several different specifications of the model. First, we estimate a very abbreviated version of the model including the $Firm\ specific\ characteristic$ vector only. The baseline model including only the basic variables is aiming to capture differences in the decision to use tax havens only given the company size, age, profitability, internationality, and indebtedness. This model will be used as a benchmark model for comparison and evaluation of the performance of the more advanced logit specifications. This specification, however, already allows us to assess the correctness of Hypothesis 1 and Hypothesis 3, as it contains the measures for the firm size, profitability, internationality, and indebtedness.

Second, we will estimate a specification containing both the $Firm\ specific\ characteristic$ vector and the $Sector\ dummy$ vector. This estimation will allow for testing of Hypothesis 2. Thirdly, a specification with more general sector-specific dummy variables, including only the $Manufacturing$ and $Service$ dummy variables, will be estimated. All these model specifications will be estimated with the originally defined dependent variable. Additionally, as we discussed in Section 3.2, we will report the results of these regressions for the case when the Netherlands is excluded from the group of tax havens as well.

Previous research has, for the most part, treated tax havens as a homogeneous group of countries. As was obvious from the very brief description and classification of tax havens in Section 3.2, the chosen tax haven list cannot be regarded in that way. The four major tax havens tend to attract different firms through various distinct methods. To address the pronounced heterogeneity between these tax havens, the analysis will be performed for each of the four tax havens separately as well. To make this analysis possible, we had to create a set of slightly modified dependent variables, which would be equal to one only if the company uses that particular tax haven, and zero in all other cases (if it is either not a tax haven user, or it uses different tax haven). The approach allows to capture the potential differences in the determinants of demand for tax haven operations between the individual tax havens.

Apart from cross-haven heterogeneity in the demand for tax haven operations, there might as well be heterogeneity in the firm-specific characteristics of tax haven users from different sectors. To test this theory, we will use the baseline model and again apply the specification to a set of slightly modified dependent variables. The dependent variable in this case is equal to one only if the company is a tax haven user and is simultaneously operating in the sector in question, and zero otherwise. This set of specifications that employs clustering of the firms based on sector will allow us to unearth any potential cross-sector heterogeneity among tax haven users.

We will apply the methodology described in this section to the dataset of 15,530 Czech companies and their financial data for year 2013, i.e. the year for which there was the largest number of observations available.

4.3 Estimation technique and expectations

Having described the methodology and various specifications of the logit model we will estimate, the chapter will continue with comments on the estimation technique and the initial expectations of the direction of estimated coefficients based on both previous literature and our own judgement.

Binary choice models are typically estimated by the method of maximum likelihood and thus it will be applied here as well. The regression coefficients in the individual models will be estimated using the Maximum likelihood estimation (MLE). The essence of MLE is the maximization of the log-likelihood function. The log-likelihood function for a sample with n observations can be expressed as follows:

$$\mathcal{L}(\beta) = \sum_{i=1}^{n} \ell_i(\beta) = \sum_{i=1}^{n} \{y_i log[G(x_i\beta)] + (1 - y_i) log[1 - G(x_i\beta)]\}$$

where $G(\cdot)$ is the cumulative distribution function for the standard logistic random variable. Because this function has values strictly between zero and one, we know that $\ell_i(\beta)$ is well-defined for all values of β (Wooldridge, 2009). The MLE of the coefficients β_k (denoted $\widehat{\beta_k}$) is the logit estimator, which maximizes the log-likelihood function of our sample and therefore it tells us what are the most likely values of our regression coefficients. Fortunately, this estimation technique is included in most statistical packages available (including STATA), and therefore the computations are done automatically. It should be noted that all empirical work throughout this thesis has been carried out in the statistical software STATA version 12.0.

When interpreting the results it is important to remember that the estimated parameters of the logit model, like those of any non-linear model, do not represent the marginal effects of independent variables on the dependent variable that we are used to analysing (Greene, 2012). The signs of the coefficients, however, are the true representations of the direction of the effect of explanatory variables on the dependent variable, which is the primary focus of the thesis. It means that based solely on the sign of the coefficient, we are able to say whether an explanatory variable increases or decreases the probability of the outcome, in this case the use of a tax haven.

Nonetheless, we will report the results in the form of marginal effects at means (MEMs). MEMs in the case of logit model are computed as partial derivatives of the prediction function with respect to individual explanatory variables, and these partial derivatives are evaluated at the sample means of the data. Consequently, we will be able to comment on the estimated magnitude of the effects of the explanatory variables on probability of success as well.

The expected effects of explanatory variables (both the firm-specific characteristics and the sector-specific dummy variables) have been mentioned throughout the thesis, specifically in Section 2, but it is prudent to provide a brief summary at this point. First, we expect the Age variable to have negative effect but with a certain turning point, thus the second order term Age^2 should have positive effect (Jones & Temouri, 2013).

Second, we expect the coefficients of variables representing firm size – $Ln\ assets$ and $Ln\ no.of\ employees$ – and profitability – $Ln\ profitability$ – to be positive and thus to have positive effect on the probability of tax haven use. There are several justifications available in literature, as the measures of size and profitability are considered to be the most important determinants of tax haven use (Graham & Tucker, 2006). Larger and more profitable firms may engage in tax haven activities simply due to economies of scale in tax avoidance (Markle & Robinson, 2012). Additionally, larger firms tend to be more productive and hence more likely to be able to overcome the costs associated with setting up tax haven operations and the subsequent income reallocation (Gumpert et al., 2011). Larger and more profitable firms are also more adept at taking advantage of complex business structures utilizing intra-firm debt, dividends, and royalty payments, which are all used when engaging in tax haven operations (Jones & Temouri, 2013).

Third, similar conclusion can be made for the measures of company's internationality. The effect of the variable $Ln\ no.of\ comp.in\ cg$ is again expected to be positive. Companies with stronger international presence and with large operations abroad will likely have more tax planning opportunities and thus higher incentive to use tax havens (Leblang 1998). Additionally, Desai et al. (2006b) find evidence that firms with significant foreign operations are more likely to own tax haven affiliates.

Fourth, to express the expectation on the indebtedness measure was a bit more difficult. The evidence from relevant literature on this topic is inconsistent, and the resulting proposed effects are often contradictive. According to Hines (2010), tax havens are attractive for companies that choose debt financing over issuing of equity due to tax deductibility of interest payments. This would point to conclusion that firms with higher leverage are more likely to use tax havens, which is supported by findings of Egger et al. (2010) as well. Conversely, Graham & Tucker (2006) suggest that tax shelters produce non-debt tax shields that can pose as a substitute for corporate debt, and find that firms using tax shelters exhibit systematically lower indebtedness. This finding has been corroborated by the research of Jones & Temouri (2013). In conclusion, we predict the coefficient of $Ln\ debt\ ratio$ to be negative and thus we expect lower indebtedness to be connected with higher propensity to use tax havens.

Finally, the expectation for sector-specific dummy variables is that firms from more R&D intensive industries will have higher propensity to use tax havens than firms from less R&D intensive industries or service firms. This assertion is supported by majority of the academic literature including Voget (2011), Markle & Robinson (2012), Gumpert et al. (2011), Desai et al. (2006b), and Graham & Tucker (2006), who all stipulate that relocation of income generated by intangible property is relatively easier. Hence, based on the previous research we expect the coefficient of variable $High\ technology$ to be the highest of all the sector-specific dummy variables, while the coefficient of $Less\ knowledge\ intensive\ services$ is expected to be the lowest.

4.4 Endogeneity

Before the thesis continues any further, we should address some issues that might arise throughout the analysis with respect to the variables used and the nature of the empirical problem the thesis deals with. The direction of causality is unfortunately not easy to prove in this topic and, as a matter of fact, it is an issue with many fields of economics, in particular corporate finance (Graham & Tucker, 2006). In the specific problem the thesis deals with, it might be the case that larger, more profitable, and more internationally present firms will be more likely to use tax havens in order to decrease their taxes. Conversely, it just might be the case that the tax haven use actually improves the performance of the company (through favourable business environment, tax advantages, etc.).

The endogeneity of the tax haven use is a similar issue. Do the firms decide for the use of tax haven operations based on their performance? Or does the performance change as a result of that decision? Moreover, the decision can be made with the hope that the firm's performance will change in the desired way. While endogeneity and causality are of course not identical concepts, the presence of causality can indicate endogeneity and vice versa (Zemčík & Tóth, 2006).

If there was a panel dataset available in this area, it would be feasible to test for the so called Granger causality. The test for Granger causality can tell us whether one time series is useful in forecasting of another time series, and thus whether there is some predictive causality present. If there would have been found Granger causality in both directions between the dependent variable and some of the explanatory variables, it could have been interpreted as indication of endogeneity (Zemčík & Tóth, 2006). Unfortunately, as was explained in Section 3, the amount of data available in the database was not sufficient for panel data analysis. Furthermore, the inclusion of the time invariant sectoral dummy variables, which is crucial in our analysis for testing of Hypothesis 3, would have prevented us from using fixed effects in the panel data estimation. This would have hindered our estimation even more.

Additionally, this issue is neglected in absolute majority of the studies the thesis builds upon, sometimes the issue is not treated or mentioned at all in the studies (Jones & Temouri, 2013). Therefore, there is little guidance on how to effectively resolve it. Nevertheless, there are studies where the issue is addressed properly. Gumpert et al. (2011) deal with endogeneity of average foreign non-haven tax rates, but since our analysis is contained to one country, the situation does not apply to this particular case. However, they use linear fixed effects model and instrumental variables to solve this issue. Desai et al. (2006b) deal briefly with the endogeneity of foreign non-haven tax rates as well. Another possible way to tackle endogeneity of an explanatory variable used by several researchers is to include lagged terms of the endogenous variable into the regression (Sabirianova Peter et al., 2005; Maffini, 2012; Graham & Tucker, 2006). Finally, Hanousek et al. (2007) employ first differencing as well as the instrumental variables. The endogeneity of firm-specific factors, however, is not dealt with in any of the studies. Additionally, the inclusion of lagged terms or the use of first differencing is not feasible in our case due to the low availability of data from previous years.

In conclusion, the issue of endogeneity and reversed causality certainly cannot be taken lightly or altogether discarded in the analysis. Despite being unable to test for the Granger causality due to the restricted dataset, it is reasonable to assume that some form of endogeneity is present in the data. Since the thesis examines a single cross-section of data, it does not implicate to be able to identify any causal effects between the variables. The results themselves should, therefore, be interpreted as indication of correlation only. Any kind of conclusion about the direction of causality cannot be drawn from the results and so, any causality inference should be refrained from. Instead, the thesis offers useful evidence on the correlation between firm-specific and sector-specific characteristics and the tax haven use of Czech firms.

5 Empirical results

In this section, we present the empirical results obtained in the analysis. First, we discuss the results of the regressions with all tax havens included in the dependent variable. Second, we will present a separate discussion for the results of identical regressions while excluding the Netherlands from the pool of tax havens. Third, we will perform the analysis for each of the individual major tax havens separately. We will do both an analysis including the complete set of sectoral dummy variables, and an analysis including the aggregated $Service$ and $Manufacturing$ dummy variables only. Lastly, we will conduct an analysis for tax haven users clustered by sectors as well – again both on the more detailed and aggregated levels.

5.1 All tax havens analysis

At the very beginning, we will perform the analysis of tax havens as a homogenous group. The dependent variable in the first four regressions is equal to one if the company is a tax haven user, and zero otherwise. The company is considered a tax haven user, if it has either a subsidiary or an owner in a country marked as tax haven. In this analysis, we consider the complete list of tax havens as defined in Section 3.2, meaning including the Netherlands.

Table 5.1 presents the results of the regressions. The first two columns present the results of the baseline models, where column (1) shows the results of a baseline model without the Age variable and column (2) shows the results of baseline model including the Age variable. Specification (3), whose results are reported in the third column, builds on the baseline model by including the sectoral dummy variables and thus containing the full set of explanatory variables. And finally, in column (4) of the table we can find the results of the logit regression with aggregated sectoral dummy variables. All results are reported as MEMs with robust standard errors in parentheses.

We have found clear support for Hypothesis 1. Based on the results of the regressions, the larger, more profitable, and more international firms are estimated to be more likely to use tax haven operations. The findings are in line with previous

research (Gumpert et al., 2011; Desai et al., 2006b; Graham & Tucker, 2006). This is evidenced by the positive coefficients of variables: $Ln\ assets$, $Ln\ profitability$ and $Ln\ no.of\ comp.in\ cg$. All three coefficients are statistically significant at 1% level and also economically significant across all four specifications. As was discussed above, it is very hard to talk about the direction of causality in this case. What the results tell us, basically, is that there is a positive correlation between the three individual firm-specific variables and the likelihood of the firm to be using tax haven operations. The Age variable behaves as expected as well, having positive coefficient of the second order term and negative coefficient of the first order term. This result confirms our assumption that there is a turning point in the relationship between firm age and the use of tax haven operations. Old and new firms tend to be more likely to use tax havens, as evidenced by the estimates.

Regarding Hypothesis 2, the results of the regression go against the evidence presented in previous studies (Gumpert et al., 2011; Desai et al., 2006b; Markle & Robinson, 2012) where R&D intensive firms were more likely to be tax haven users due to the easier reallocation of income from intangible assets (such as patents and licenses). In specification (3), the coefficient of high technology manufacturing firms is the lowest from all the sectoral dummy variables. That is exactly the opposite result than was our initial expectation. Additionally, the coefficient of knowledge intensive service firms was the absolute highest. Interestingly, the whole set of sectoral dummy variables had positive coefficients relative to the control group. That would suggest that all the manufacturing and service firms were more likely to engage in tax haven operations than firms from the control group (such as agriculture, forestry, fishing, mining, electricity gas, and water supply), which considering the nature of such businesses is not entirely unlikely.

What is rather unexpected is the magnitude of the coefficients. The coefficients in descending order of magnitude are: knowledge intensive services, medium-high technology manufacturing, less-knowledge intensive services, low technology manufacturing, medium-low technology manufacturing, and only then high technology manufacturing. Our results suggest that service firms in the Czech Republic are more often the tax haven users than manufacturing firms. Even if we look at the aggregated sector groups only, which are represented in specification (4), the results support the conclusion that service firms are more likely to use tax havens than manufacturing

firms. In addition to the relatively higher representation of tax haven use by service firms in our sample (there are almost twice as more tax haven users among service firms as can be seen in Table 5.6), these results are in line with significantly lower fixed costs faced by service firms when setting up tax haven operations (Gumpert et al., 2011). Furthermore, the company often needs to locate some of its real business activity in the tax haven in order to avoid taxation. According to the evidence suggested by our results, this might be easier and less costly to accomplish for service firms than for manufacturing firms.

Consequently, we propose the policy makers might shift their focus from R&D intensive industries to ordinary business activities in services, as they appear to be more attracted towards tax haven use. We encourage development of policy measures increasing the cost of profit reallocation into tax havens, which might discourage firms from tax haven investment. Moreover, since service firms face higher marginal costs of profit shifting (Gumpert et al., 2011), such policies might have greater effect on service firms. Additionally, the demand for tax haven operations by service firms and their tax avoidance strategies might offer further interesting research opportunities as well.

The coefficient of $Ln\ debt\ ratio$ is positive, statistically significant at 1% level, and economically significant across all four specifications. This results is in direct contradiction to Hypothesis 3, based on Graham & Tucker (2006), and suggests that there is a positive correlation between high debt ratios of a firm and the firm being a tax haven user. The evidence we found is consistent with Desai & Hines (2002), who suggest that higher leverage is associated with more often relocation of headquarters, and Egger et al. (2010), who find foreign-owned firms have systematically larger debt ratios than their domestically owned counterparts. Our findings also support the opinion of Hines (2010), who suggests tax haven use is favourable for firms with higher leverage due to tax deductibility of interest costs. This feature would be especially appealing to firms that want to finance their FDI through issuance of debt rather than equity. Anecdotal evidence suggests that Czech institutional environment's influence on capital structure of Czech firms is in line with the pecking order theory and thus, firms in general tend to prefer both internal sources and debt to equity. Therefore, equity financing is only used if financing sources from internal funds and debt have already been exhausted.

Table 5.1: Regression results – tax havens including the Netherlands

Variables/Model	(1) Baseline model 1	(2) Baseline model 2	(3) Sector dummies	(4) Aggregated sectors
Age		-0.00136	-0.00146**	-0.00147*
		(0.000833)	(0.000742)	(0.000752)
Age^2		8.89e-06	1.72e-05	1.64e-05
		(2.69e-05)	(2.37e-05)	(2.41e-05)
Ln assets	0.00967***	0.00988***	0.00998***	0.00974***
	(0.00115)	(0.00113)	(0.00106)	(0.00106)
Ln debt ratio	0.00852***	0.00676***	0.00619***	0.00594***
	(0.00215)	(0.00210)	(0.00193)	(0.00194)
Ln profitability	0.00445***	0.00401***	0.00332***	0.00343***
	(0.00126)	(0.00124)	(0.00114)	(0.00115)
Ln no. of employees	-0.00290**	-0.00196	-0.00231**	-0.00187
	(0.00127)	(0.00124)	(0.00116)	(0.00117)
Ln no. of comp. in cg	0.00939***	0.00925***	0.00819***	0.00832***
	(0.000788)	(0.000784)	(0.000751)	(0.000747)
High technology			0.0327**	
			(0.0133)	
Medium-high technology			0.0371***	
			(0.00664)	
Medium-low technology			0.0333***	
			(0.00638)	
Low technology			0.0357***	
			(0.00701)	
Knowledge intensive services			0.0448***	
			(0.00565)	
Less-knowledge intensive services			0.0359***	
			(0.00527)	
Manufacturing				0.0348***
				(0.00555)
Service				0.0388***
				(0.00513)
Observations	15,530	15,530	15,530	15,530
Pseudo R-squared	0.0734	0.0771	0.0891	0.0880
Log Likelihood	-2795	-2784	-2748	-2751

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

Additionally, the higher indebtedness of tax haven users could be a sign of debt sharing (Janský & Kokeš, 2015). Furthermore, since we cannot be sure of the direction of causality, as was made clear in Section 4.4, another possible explanation for the positive coefficient of $Ln\ debt\ ratio$ could be the reversed causality in this instance. It is conceivable that tax haven users tend to increase their indebtedness after setting up the tax haven operations in comparison to the leverage they had before, precisely because of the tax benefits described by Hines (2010).

Our findings point to a conclusion that Czech firms engage in profit shifting through the use of debt financing. It is, therefore, prudent for policy makers to specifically target the risks associated with interest deductibility. This issue is addressed by the Base Erosion and Profit Shifting (BEPS) initiative launched by OECD in 2013. Action 4 of the created action plan is specifically aimed at addressing risks of profit shifting through the use of interest expense. OECD (2015a) recommends that countries introduce a fixed ratio rule which would limit the deductibility of interest. The aim is to let the firm deduct interest expense from its earnings, but only to a certain proportion of the earnings, so that some of the profits remain subject to taxation. The recommended corridor for the fixed ratio of interest expense to EBITDA is set between 10% and 30%.

The coefficients of the majority of variables have direction as expected, with the exception of $Ln\ no.of\ employees$, which comes with the opposite sign than was our initial expectation. The coefficient is negative in all four specifications, while we would have expected it to be positive. The variable is, however, statistically significant only in specifications (1) and (3) at 5% level. In specifications (2) and (4), it is statistically insignificant. Additionally, the coefficient is very small in magnitude. This would suggest that the dependent variable is generally unaffected by this indicator. The rationale behind the opposite sign could be that the ability of a firm to relocate part of their profits into tax haven could be hindered by too high number of employees.

Once again we would like to point out that the reported coefficients represent the marginal effects at means (MEMs). That is why there is no constant reported in the results even though we have run the logit regressions including a constant. What the magnitudes tell us is the change in the probability of the outcome when a predictor increases instantaneously in case of a continuous variable, or by one unit in case of a dummy variable (from 0 to 1). For instance, a change in $High\ technology$ dummy variable from 0 to 1 is associated with 3.27% increase in the probability of the firm being a tax haven user in specification (3). Similarly, in specification (2), an immediate increase in $Ln\ assets$ is connected with 0.988% increase in the outcome probability.

5.1.1 Excluding the Netherlands

This set of regression results represents the same specifications as in the Section 5.1 above. The dependent variable in the logit regressions, however, is slightly different.

It takes on the value of one if the company is tax haven user, and zero otherwise. But for this set of regressions we exclude the Netherlands from the pool of tax havens, as many academics do not consider it a tax haven despite the empirical evidence found in support of that assertion (Weyzig, 2012). We compare the results obtained in the estimation with the previous regression results that serve as basis for our comparison. The objective is to determine whether the results have changed significantly after we adjusted the list of tax haven countries. The results can be found in Table 5.2.

Table 5.2: Regression results – tax havens excluding the Netherlands

Variables/Model	(5) Baseline model 1	(6) Baseline model 2	(7) Sector dummies	(8) Aggregated sectors
Age		-0.000986	-0.00106	-0.00106
		(0.000730)	(0.000656)	(0.000663)
Age^2		5.53e-06	1.15e-05	1.09e-05
		(2.39e-05)	(2.13e-05)	(2.16e-05)
Ln assets	0.00663***	0.00677***	0.00688***	0.00671***
	(0.000963)	(0.000936)	(0.000889)	(0.000891)
Ln debt ratio	0.00566***	0.00435**	0.00399**	0.00381**
	(0.00181)	(0.00176)	(0.00161)	(0.00162)
Ln profitability	0.00251**	0.00218**	0.00175*	0.00183*
	(0.00105)	(0.00102)	(0.000947)	(0.000953)
Ln no. of employees	-0.00210*	-0.00139	-0.00160	-0.00135
	(0.00108)	(0.00105)	(0.000986)	(0.000998)
Ln no. of comp. in cg	0.00694***	0.00682***	0.00605***	0.00615***
	(0.000640)	(0.000639)	(0.000612)	(0.000611)
High technology			0.0223*	
			(0.0115)	
Medium-high technology			0.0253***	
			(0.00570)	
Medium-low technology			0.0263***	
			(0.00535)	
Low technology			0.0236***	
			(0.00617)	
Knowledge intensive services			0.0317***	
			(0.00484)	
Less-knowledge intensive services			0.0258***	
			(0.00450)	
Manufacturing				0.0250***
				(0.00475)
Service				0.0277***
				(0.00438)
Observations	15,530	15,530	15,530	15,530
Pseudo R-squared	0.0639	0.0675	0.0779	0.0771
Log Likelihood	-2229	-2220	-2195	-2197

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

As is apparent from the first glance, the results obtained in the four regressions are very similar to the original ones. The signs of all coefficients stayed unchanged, and the magnitudes changed only very slightly, they decreased negligibly in most cases. The most notable difference in this new regression is the decreased statistical significance of some explanatory variables as well as decreased Pseudo R-squared in all specifications. $Ln\ profitability$ is significant only at 5% or 10% levels, $Ln\ debt\ ratio$ is significant at 5% level in specifications (6) through (8), and $Ln\ no.of\ employees$ is significant only in specification (5) at 10% level. In the remaining specifications, these variables are statistically insignificant.

We have performed a χ^2 test of linear restrictions to see whether the results of corresponding specifications differ significantly when the Netherlands is included in the tax haven list, and when it is not. For instance, we have taken the coefficients of $Ln\ debt\ ratio$ from specifications (3) and (7) and tested whether they are equal. We have performed the same procedure for each coefficient from every specification. We have performed the test for the whole specifications as well, testing the joint hypotheses that all the coefficients are equal to each other in two corresponding specifications. In none of the tests were we able to reject the null hypothesis of the coefficients or specifications being equal, which leads us to the following conclusion. By excluding the Netherlands from the pool of tax haven countries, we did not gain any significantly different results except from lower statistical significance and goodness-of-fit values. This would suggest that the data on firms using the Netherlands for tax haven operations is valuable in terms of explaining the correlation between tax haven use and firm-specific factors in general. Therefore, based on the comparison and our judgement, the Netherlands can be considered a tax haven country, at the very least in the case of Czech firms' behaviour.

5.2 Individual tax haven analysis and comparison

Previous research has largely considered tax havens or secrecy jurisdictions a homogenous group of countries. This approach, however, disregards any possible heterogeneity between individual tax havens and might bias the results in favour of one tax haven over others, depending on how strongly it is represented in the sample. The differences as to the firms' motivations to use a particular tax haven might be large, since the provision of relatively favourable conditions for non-residents is what makes

them attractive for investment in the first place. In the end, the route the tax haven chooses to attract the foreign economic or financial activity is what gives it the comparative advantage over others (Cobham et al., 2015).

Considering only our very brief description of tax havens on our list in Section 3.2, we have a reason to believe there is indeed some heterogeneity present. Therefore, we employ a strategy, recently also proposed by Janský & Kokeš (2016), to examine links to tax havens individually. We do so in order to uncover potential heterogeneity in the determinants of the demand for tax haven operations in those particular countries. Again, we have to remember that direction of causality is not clear in this case, so any conclusions about causal effects should be made very carefully.

The motivation behind this approach is the desire to understand better how tax havens are "chosen" (for lack of a better word) by different firms and what factors (firm-specific or sector-specific) are most strongly associated with links to specific tax havens. The distribution of tax haven users among the individual tax haven countries is summarized in Table 5.3. It is apparent that complete majority of tax haven links (almost 82%) is accounted for by the four major tax havens. The most important destination is the Netherlands with 27% of tax haven links located there, followed by Switzerland with 25%, Cyprus with 18%, and finally Luxembourg with 12%.

Table 5.3: Tax haven user distribution among countries

Tax haven country	Tax haven users	High technology	Medium-high technology	Medium-low technology	Low technology	Knowledge intensive services	Less-knowledge intensive services
the Netherlands	203	3	25	17	16	47	83
Cyprus	133	1	8	13	3	38	56
Switzerland	190	4	28	24	10	34	77
Luxembourg	92	1	5	18	11	15	38
Others	136	1	15	12	10	35	58
Total (excl. NL):	551	7	56	67	34	122	229
Total (incl. NL):	754	10	81	84	50	169	312

Source: Author's computations

Although it would seem from the overall results (reported in Table 5.1) that, in general, service firms are more likely to use tax havens than manufacturing firms, this conclusion cannot be stated categorically without further examination. It may be true

to some extent or in some particular cases. However, the separate analysis of individual tax havens will allow us to shed some more light on this topic. It is much more likely that due to the heterogeneity of tax havens as a group and their different strategies of attracting tax haven users, different type of firms tend to favour one tax haven over the others. Incidentally, service firms might prefer different tax havens than R&D intensive manufacturing firms and vice versa.

Our next set of specifications focuses on each major tax haven – the Netherlands, Switzerland, Cyprus, and Luxembourg – individually, either with full set of sectoral dummy variables, or with the aggregated groups only. The main focus is, therefore, on the sector-specific variables. The sector specific dummy variables in these regressions will tell us whether firms operating in specific sectors tend to prefer one tax haven over others. However, these regressions will allow us to test for any cross-haven differentiation among firm-specific indicators as well.

5.2.1 NACE Rev.2 2-digit level

Table 5.4 presents the results of estimating the original specification (3) on subsamples of each major tax haven individually. Each column represents results of a separate regression for different dependent variable. For instance, in specification (9), the dependent variable takes on the value of one if the firm uses the Netherlands for its tax haven operations, and zero otherwise. The results can then be compared across columns and will allow us to uncover whether there are cross-haven differences in the firm-specific and more importantly the sector-specific characteristics of the firms that choose particular tax havens.

The behaviour of firm-specific variables is more or less in line with our initial expectations and with results from the whole sample. There are, however, few notable deviations. The coefficient of $Ln\ debt\ ratio$ has a negative sign in specification (12), concerning Luxembourg. This is in line with our original assertion in Hypothesis 3 and suggests that using Luxembourg as a tax haven is equivalent to a non-debt tax shield that substitutes for tax deductibility of interest expense, thus decreasing the need of debt financing (Graham & Tucker, 2006). Nevertheless, the effect is statistically insignificant. While the effect of a firm's profitability has the expected direction in all specifications, the estimate is statistically and economically insignificant in the case of Cyprus and Luxembourg. It would seem then that variables $Ln\ debt\ ratio$ and

$Ln\ profitability$ are not significantly associated with the use of Cyprus and Luxembourg as tax havens at all.

On the other hand, $Ln\ debt\ ratio$ is statistically and economically significant in the regressions concerning the Netherlands and Switzerland, and its coefficients are positive. This points to conclusion that firms engaging in profit shifting through the use of debt financing. Janský & Kokeš (2016) find systematically higher debt ratios in tax haven users of Switzerland and the Netherlands when compared to non-haven users, thus supporting our findings. Furthermore, Weyzig (2014) finds compelling evidence of positive relationship between the use of Dutch special purpose entities and higher debt financing relative to equity.

Now let us examine the sector-specific dummy variables more closely. While we do not have any specific predictions as to the behaviour of sector-specific variables in each of these individual regressions, by examining the coefficients we can find out what type of firms favour specific tax havens. As it was in the regression including the whole sample, all of the sectoral dummy variables have positive signs with one single exception. The coefficient of $Low\ technology$ is negative but statistically insignificant in specification (11), concerning Cyprus. This result tells us that low technology manufacturing firms are less likely to use Cyprus as a tax haven than the control group.

The Netherlands and Cyprus appear to predominantly attract firms providing knowledge intensive services. Furthermore, Cyprus is apparently favoured by firms providing all types of services, even the less-knowledge intensive ones, such as real estate firms. This is consistent with previous findings of Burianová (2013), as real estate firms were the most heavily represented group among Czech firms using Cyprus as tax haven. Real estate is one of the most important sectors of Cyprus economy. Together with tourism and financial services, it accounts for 85% of its GDP. Additionally, Cyprus's tax system offers favourable treatment for real estate companies, as the income and capital gains from property held outside of Cyprus is exempt from taxation (Deloitte, 2016). On the other hand, the fact that knowledge intensive service firms are the most often tax haven users of the Netherlands is rather unexpected. We would have anticipated that high technology manufacturing firms with high R&D intensity would be among the most frequent users.

Manufacturing firms seem to be drawn to Luxembourg and Switzerland. Although, not the same type of manufacturing firms. While Luxembourg attracts mostly medium-low technology and low technology manufacturing firms, Switzerland appeals to the most R&D intensive firms, i.e. the high technology and medium-high technology manufacturing firms. Markle & Robinson (2012) suggest that R&D intensive firms take advantage of tax havens by entering into cost sharing arrangements with foreign affiliated companies in order to be able to shift income tax efficiently, as the subsidiary can avoid the obligation to pay royalties to the parent company. But small tax havens may be unable to provide the possibility of setting up these cost sharing arrangements. Hence, it is possible that R&D intensive firms would prefer large tax havens such as Switzerland. This assertion, however, does not appear to hold universally, as it does not hold for the Netherlands.

Luxembourg appears to attract medium-low technology and low technology manufacturing firms the most. The R&D intensity of those firms is going to be low and thus not an important factor. The third and fourth group that prefer Luxembourg are less-knowledge intensive and knowledge intensive service firms and for those R&D is presumed to be insignificant as well. The coefficients of the first four groups, however, differ very slightly in magnitude, so it is hard to make a definitive verdict on the most dominant group. What conclusion we can make from the results is that R&D intensity is not a fundamental determinant of tax haven use in the case of Luxembourg.

The use of specific country as a tax haven can also be influenced by the provisions and special conditions negotiated in the bilateral DTA. In particular, the definition of permanent establishment (PE) is often taken advantage of. Earnings of a foreign firm are taxable in the state only to the extent the firm has a PE there to which the earnings are attributable. The definition of PE included in a treaty is thus crucial for determining whether the non-resident firm has to pay taxes in the tax haven or not (OECD, 2015b).

If we review the DTA between Cyprus and the Czech Republic, we can find some provisions encouraging the use of Cyprus by service firms. The PE definition in the treaty here is quite strong and even the provision on taxation of services is included. Nevertheless, the abuse could stem from the use of *commissionnaire* arrangements, which are treated very superficially in the DTA. Consider an arrangement when a person makes sales in the state in its own name but on a behalf of foreign entity. This

way, the non-resident entity is able to make sales in the state without technically having a PE there, to which such sales would be attributable, so the profits would go untaxed. In addition, the person concluding the sales can be taxed only on the commission (OECD, 2015b). Since a lot of service activities (financial services) can be provided on commission, service firms might take advantage if this provision is weakly defined.

Table 5.4: Regression results – tax haven comparison (sector dummies)

Variables/Model	(9) Netherlands	(10) Switzerland	(11) Cyprus	(12) Luxembourg
Age	-0.000339	-0.000305	-0.000133	-0.000120
	(0.000340)	(0.000209)	(0.000343)	(0.000180)
Age^2	4.60e-06	9.98e-06*	-4.55e-06	3.36e-06
	(1.04e-05)	(5.13e-06)	(1.16e-05)	(5.01e-06)
Ln assets	0.00272***	0.000728	0.00295***	0.000723**
	(0.000535)	(0.000482)	(0.000377)	(0.000307)
Ln debt ratio	0.00196*	0.00247**	0.000811	-0.000248
	(0.00102)	(0.00102)	(0.000707)	(0.000405)
Ln profitability	0.00148**	0.00196***	8.15e-05	4.48e-05
	(0.000629)	(0.000565)	(0.000429)	(0.000310)
Ln no. of employees	-0.000599	0.000212	-0.000835**	0.000113
	(0.000570)	(0.000553)	(0.000417)	(0.000362)
Ln no. of comp. in cg	0.00185***	0.00261***	-0.000190	0.00112***
	(0.000390)	(0.000322)	(0.000247)	(0.000229)
High technology	0.00980	0.0108**	0.000430	0.00321
	(0.00617)	(0.00497)	(0.00645)	(0.00407)
Medium-high technology	0.0111***	0.0104***	0.000557	0.00202
	(0.00328)	(0.00289)	(0.00274)	(0.00242)
Medium-low technology	0.00636*	0.00773***	0.00261	0.00648***
	(0.00343)	(0.00297)	(0.00239)	(0.00174)
Low technology	0.0114***	0.00536	-0.00313	0.00692***
	(0.00336)	(0.00362)	(0.00386)	(0.00185)
Knowledge intensive services	0.0122***	0.00645**	0.00711***	0.00448**
	(0.00285)	(0.00284)	(0.00192)	(0.00190)
Less-knowledge intensive services	0.00975***	0.00732***	0.00340*	0.00518***
	(0.00271)	(0.00250)	(0.00178)	(0.00171)
Observations	15,530	15,530	15,530	15,530
Pseudo R-squared	0.0716	0.0730	0.0673	0.0906
Log Likelihood	-1005	-950.7	-714	-512.5

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

The interest of knowledge intensive service firms in the Netherlands might be explained by the DTA as well. The DTA between the Czech Republic and the Netherlands is the oldest one, it came into effect in 1974 and has not been renegotiated since. Thus, it fails to contain a lot of provisions that are recently being added so as to

mitigate misuse. Specifically, the definition of PE is very vague in its formulation and lacks the novel provisions that are aimed at preventing the abuse of it. The provision on taxation of services, which gives the source country the right to tax profits of non-resident companies providing services, if they are physically present in the country for certain part of the year, is not included in the treaty at all. This might warrant the interest of service firms in setting up tax haven operations in the Netherlands.

In conclusion, the results of our analysis clearly provide evidence that there exists significant heterogeneity among tax haven countries as to what type of firms they attract. Particularly, there was significant heterogeneity found between Cyprus and any other tax haven, which would indicate a unique position of Cyprus in Czech firms' perception of tax havens. Additionally, we are able to say that attractiveness of specific tax havens depends, at least to some extent, on sector-specific characteristics, as some of them differ significantly across the four specifications.

As a consequence, we believe that a shift from analyses considering tax havens as a homogenous group to examinations of individual tax haven countries is a step in the right direction and should definitely be encouraged in further academic research. With increasing data availability and quality this approach will be possible to use more frequently by academics in their work. We suggest this approach could be useful for policy makers as well. Focusing on tax havens individually might help with producing effective targeted measures to discourage specific types of firms from setting up operations in specific tax havens.

Furthermore, some of the DTAs signed by the Czech Republic would benefit from renegotiating (specifically the DTA with the Netherlands) to prevent their abuse. The OECD BEPS initiative identifies treaty abuse, i.e. treaty shopping, as one of the main causes of BEPS. Treaty shopping involves strategies where non-residents of a state attempt to obtain the benefits that are ordinarily granted to residents of that state, for instance by establishing a "letterbox" company. OECD (2015c) gives several recommendations of the provisions and treaty anti-abuse rules to address the issue. For example, adding the principal purpose test ensures that, if one of the principal purposes of the transaction or arrangement is to obtain the treaty benefits, these benefits would be denied. Similarly, limitation-of-benefits rule limits the availability of treaty benefits only to firms that fulfil certain criteria. The conditions are in place to ensure a sufficient

link between the firm and its residence in the state. The anti-abuse provisions in tax treaties ought to be supported by adoption of domestic anti-abuse rules as well.

5.2.2 Aggregated level

The analysis performed in this section is conducted on similar basis as the previous one in Section 5.2.1. Only the regressions here are modifications of the original specification (4), therefore including only the aggregated sector dummy variables. They are once again performed separately for each major tax haven. The results are reported below in Table 5.5.

The results are very similar to the ones done on sectoral level. There are again some deviations from our expectations. Most notably, $Ln\ debt\ ratio$ and $Ln\ profitability$ both have negative coefficients in the case of Luxembourg. The negative sign of the indebtedness measure is in line with our original Hypothesis 3 and suggests that using Luxembourg as a tax haven is equivalent to the use of non-debt tax shield, thus diminishing the need of debt financing (Graham & Tucker, 2006). The negative direction of the profitability measure, however, is truly puzzling and is in opposition to the results from the analysis on more detailed level.

The aggregated dummy variables are all statistically significant, with the exception of $Manufacturing$ in the case of Cyprus, and have positive coefficients. What is evident from the data sample and the analysis of individual tax haven countries is the tendency of manufacturing firms to favour Switzerland and Luxembourg, and the propensity of service firms to prefer Cyprus and the Netherlands. Nonetheless, when aggregated, the coefficients of $Manufacturing$ and $Service$ do not differ very significantly in magnitude, except in the case of Cyprus.

Manufacturing firms might be drawn to Luxembourg and Switzerland because of the tax benefits provided for wide range of investment vehicles, such as holding companies. Not to mention, both of those economies are highly developed and are arguably very suitable for high technology manufacturing and R&D intensive companies. On the other hand, the attraction of service firms (namely real estate companies) to Cyprus might be influenced not only by the specifics of the country's tax laws and the DTA with the Czech Republic, but historically as well. Cyprus has been traditionally considered "the favourite and the cheapest" tax haven of Czech firms

and has stayed that way even in spite of the changes imposed by the EU (such as increase of corporate tax rate etc.). Also, both countries (Cyprus and the Netherlands) are known for their high level of investment protection and their extensive network of DTAs, but that would signify their attraction to all tax haven users in general, not necessarily a specific group.

Table 5.5: Regression results – tax haven comparison (aggregated sectors)

Variables/Model	(13) Netherlands	(14) Switzerland	(15) Cyprus	(16) Luxembourg
Age	-0.000349	-0.000319	-0.000148	-0.000111
	(0.000348)	(0.000210)	(0.000352)	(0.000167)
Age^2	4.64e-06	1.05e-05**	-4.85e-06	3.19e-06
	(1.07e-05)	(5.20e-06)	(1.18e-05)	(4.31e-06)
Ln assets	0.00270***	0.000817*	0.00297***	0.000722**
	(0.000542)	(0.000472)	(0.000382)	(0.000318)
Ln debt ratio	0.00193*	0.00251**	0.000686	-0.000261
	(0.00103)	(0.00102)	(0.000736)	(0.000415)
Ln profitability	0.00152**	0.00200***	0.000144	-4.18e-07
	(0.000634)	(0.000564)	(0.000450)	(0.000325)
Ln no. of employees	-0.000460	0.000209	-0.000732*	4.09e-05
	(0.000579)	(0.000561)	(0.000437)	(0.000378)
Ln no. of comp. in cg	0.00189***	0.00262***	-0.000111	0.00115***
	(0.000389)	(0.000321)	(0.000258)	(0.000234)
Manufacturing	0.00942***	0.00848***	0.000708	0.00576***
	(0.00285)	(0.00257)	(0.00216)	(0.00176)
Service	0.0107***	0.00711***	0.00478***	0.00518***
	(0.00265)	(0.00248)	(0.00176)	(0.00177)
Observations	15,530	15,530	15,530	15,530
Pseudo R-squared	0.0691	0.0714	0.0607	0.0821
Log Likelihood	-1007	-952.3	-719.1	-517.3

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

The findings are consistent with the more detailed analysis from the previous section, leading to a conclusion that specific tax havens tend to attract different type of firms. Once again, firms choosing Cyprus as a tax haven demonstrate a significantly different pattern from firms that prefer any other tax haven.

5.3 Sectoral analysis of tax haven use

Finally, the last set of regressions will attempt to unearth any potential cross-sector differences between the determinants of tax haven demand. Just as there might be

heterogeneity among firms choosing specific tax havens, there is a reason to believe that firm-specific characteristics of tax haven users from individual sectors would exhibit significant differences as well.

Table 5.6 presents the distribution of firms and tax haven users among individual sectors. It is apparent from the table that the distribution is very disproportionate. The allocation is clearly dominated by service firms in general, there are twice more service firms in our sample than there are manufacturing firms. The most represented groups in the sample are the less-knowledge intensive service firms, closely followed by the knowledge intensive service firms. The representation of individual categories of manufacturing firms is much less frequent. Furthermore, the distribution of tax haven users across the industries and service groups follows essentially the same pattern, and so the same conclusions hold.

Table 5.6: Distribution of firms and tax haven users among sectors

Sector	# of firms	# of tax haven users	Proportion	NL	CY	CH	LU
High technology	155	10	6.45%	3	1	4	1
Medium-high technology	1,189	81	6.81%	25	8	28	5
Medium-low technology	1,724	84	4.87%	17	13	24	18
Low technology	1,064	50	4.70%	16	3	10	11
Knowledge intensive services	2,604	169	6.49%	47	38	34	15
Less-knowledge intensive service	6,137	312	5.04%	83	56	77	38
Manufacturing	4,132	225	5.45%	61	25	66	35
Service	8,741	481	5.50%	130	94	111	53
Control group	2,657	48	1.81%	n/a	n/a	n/a	n/a

Source: Author's computations

The range of tax haven user proportions among sectors is surprisingly narrow. Additionally, the proportion of tax haven users is almost identical for manufacturing and service firms, it is 5.45% and 5.50% respectively. If we consider the more detailed stratification, we find a bit more differentiation. Nevertheless, the percentages range only between 4.70% and 6.81%. The sectors with highest proportion of tax haven users are high technology and medium-high technology manufacturing, and knowledge intensive services with proportion of tax haven users around 6.5%. Low technology

and medium-low technology manufacturing firms have the lowest proportion of tax haven users, 4.87% and 4.70% respectively.

5.3.1 NACE Rev.2 2-digit level

Because we are clustering the observations based on the sector to which the firm belongs, we cannot include the sector-specific dummy variables in the regression. Thus, only the firm-specific characteristic can be analysed. Table 5.7 shows the results of six different specifications that are only modifications of the original baseline model (specification (2)) and thus they include only firm-specific variables. The feature that is distinctive from the original model is the dependent variable. The dependent variable takes on the value of one if the firm is a tax haven user and simultaneously its core business is categorized as belonging to the particular sector that is being analysed, and zero otherwise.

The most notable deviations from our expectations or from previous estimations are the following. $Ln\ assets$ is negatively correlated with tax haven use by knowledge intensive service firms and furthermore it is statistically insignificant. $Ln\ no.of\ employees$ has negative coefficient in the case of less-knowledge intensive firms. Both of the variables are used in the regressions as a one of the measures of firm size. Interestingly, the alternative size measure has the opposite sign in both mentioned groups, so the measures of size appear to contradict each other. Gumpert et al. (2011) find that the probability of tax haven investment by service firms is generally unaffected by firm size. Together with the fact that service firms face lower fixed costs of tax haven investment, it is conceivable that sufficient firm size would not be a requirement for tax haven use by service firms and thus not a fundamental determinant.

Additionally, $Ln\ debt\ ratio$ has negative relationship with tax haven use of low technology manufacturing firms, suggesting they use tax havens as a substitute for non-debt tax shield (Graham & Tucker, 2006). Profitability appears to be positively correlated with tax haven use in all six specifications. The relationship, however, is statistically significant only for knowledge intensive service firms. The internationality measure has positive coefficient across all specifications as well, but is statistically and economically significant only for service firms (both knowledge intensive and less-knowledge intensive) and medium-low technology manufacturing firms.

Table 5.7: Regression results – sectoral analysis (sector dummies)

Variables/Model	(17) High technology	(18) Medium-high technology	(19) Medium-low technology	(20) Low technology	(21) Knowledge intensive services	(22) Less-knowledge intensive services
Age	-5.35e-05*	-8.82e-05	0.000146	0.000245	-0.000246	-0.000206
	(3.08e-05)	(0.000198)	(0.000282)	(0.000169)	(0.000400)	(0.000542)
Age^2	1.04e-06*	2.62e-07	-6.79e-06	-8.51e-06	-2.92e-06	-1.34e-07
	(5.91e-07)	(6.13e-06)	(8.63e-06)	(5.77e-06)	(1.39e-05)	(1.79e-05)
Ln assets	8.78e-05	0.000439**	0.000545**	0.000494***	-0.000150	0.00394***
	(8.32e-05)	(0.000197)	(0.000263)	(0.000171)	(0.000618)	(0.000619)
Ln debt ratio	0.000128	0.000607	0.000368	-0.000263	0.000206	0.00455***
	(0.000172)	(0.000433)	(0.000560)	(0.000241)	(0.00106)	(0.00126)
Ln profitability	3.07e-05	0.000297	0.000131	4.84e-05	0.00207***	0.000754
	(0.000120)	(0.000301)	(0.000357)	(0.000157)	(0.000601)	(0.000683)
Ln no. of employees	0.000145*	0.00158***	0.00135***	0.000668***	0.00117*	-0.00624***
	(8.29e-05)	(0.000245)	(0.000316)	(0.000188)	(0.000634)	(0.000686)
Ln no. of comp. in cg	3.47e-05	0.000247	0.000505**	7.99e-05	0.00240***	0.00460***
	(6.51e-05)	(0.000170)	(0.000219)	(0.000115)	(0.000327)	(0.000450)
Observations	15,530	15,530	15,530	15,530	15,530	15,530
Pseudo R-squared	0.0854	0.120	0.0729	0.133	0.0562	0.0827
Log Likelihood	-76.35	-445.9	-484.2	-292	-879.7	-1402

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

Interestingly, the age variables have inverse relationship with tax haven use for medium-low technology and low technology manufacturing firms, suggesting firms that are neither brand new, nor very old predominantly use tax havens. For both types of service firms, the turning point in the relationship with age is entirely absent, as both Age and Age^2 have negative coefficients. This would suggest that the newly established service firms choose to use tax havens most often.

When testing for differences between specifications, the null hypothesis of two specifications being equal was rejected for every pairing of any manufacturing group (high technology, medium-high technology, medium-low technology, or low technology) and any service group (knowledge intensive or less-knowledge intensive). That would suggest there exists significant heterogeneity in the determinants of tax haven demand between manufacturing and service firms. The conclusion is in line with findings by Gumpert et al. (2011) on a sample of German MNCs. This further reinforces our recommendation for policy makers to specifically target service firms when creating policies or targeted measures to mitigate tax haven use. Since we found Czech service firms are more often engaged in the use of tax haven operations and they

show significantly different pattern of tax haven investment from manufacturing firms, we believe they should be at the centre of attention.

5.3.2 Aggregated level

Since the analysis on the NACE Rev.2 2-digit level suggested differences are present only between manufacturing and service groups, let us look at the results on the aggregated level and determine whether the conclusions hold. Table 5.8 presents the results of regressions similar to the ones in the previous section. Once again the original baseline model was utilized with a slightly modified dependent variable, only this time the estimation was performed on the aggregated level – for manufacturing and service sectors only.

Table 5.8: Regression results – sectoral analysis (aggregated sectors)

Variables/Model	(23) Manufacturing	(24) Service
Age	9.06e-05	-0.000538
	(0.000396)	(0.000730)
Age^2	-9.50e-06	-2.64e-06
	(1.25e-05)	(2.45e-05)
Ln assets	0.00174***	0.00457***
	(0.000417)	(0.000900)
Ln debt ratio	0.000708	0.00539***
	(0.000788)	(0.00175)
Ln profitability	0.000531	0.00276***
	(0.000515)	(0.000971)
Ln no. of employees	0.00395***	-0.00609***
	(0.000466)	(0.000986)
Ln no. of comp. in cg	0.000857***	0.00763***
	(0.000316)	(0.000604)
Observations	15,530	15,530
Pseudo R-squared	0.125	0.0683
Log Likelihood	-1029	-1998

Note: Coefficients represent the marginal effects at means (MEMs). Robust standard errors are reported in parentheses. Statistical significance level of explanatory variables is denoted as follows: *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's computations

The results here are in line with the whole sample regression. The firm-specific variables all have positive coefficients except for $Ln\ no.of\ employees$ in the analysis of manufacturing firms. In general, the coefficients of firm-specific characteristics in the specification analysing manufacturing firms are smaller in magnitude, except for $Ln\ assets$ and $Ln\ no.of\ employees$. Additionally, the coefficients of $Ln\ debt\ ratio$

and $Ln\ profitability$ are statistically insignificant, while in the specification for service firms all firm-specific variables are statistically significant at 1% level. The inverse relationship with Age variables appears again for manufacturing firms and turning point is absent for service firms as well.

In the end, the differences between these two groups do not seem very large. While testing the two specifications, however, the null hypothesis was rejected very strongly and thus the two specifications cannot be considered equal. The most notable statistically significant differences between the specifications were present for the measures of internationality and size, i.e. the coefficients of variables $Ln\ no.of\ comp.in\ cg$ and $Ln\ no.of\ employees$.

To conclude, our analysis confirms the results from the previous regressions that there exists significant cross-sector heterogeneity in the firm-specific characteristics of tax haven users. Even though the differences are present on the aggregated level only (between service and manufacturing groups), they cannot be overlooked. Given the share of service industries is increasing in developed economies and service firms appear to use tax havens more frequently (at least in the case of the Czech Republic), the demand for tax haven operations by service firms and their tax avoidance strategies could offer interesting research opportunities.

5.4 Goodness-of-fit

Few words should be said about the goodness-of-fit of the models estimated in the empirical part of the thesis. The most commonly used measure of goodness-of-fit for binary choice models is the Pseudo R-squared, sometimes called the likelihood ratio index. Perhaps the most widely known is the McFadden's Pseudo R-squared, which is incidentally reported with the STATA logit regression output by default, and it is defined as:

$$Pseudo\ R^2 = 1 - \frac{\mathcal{L}_{ur}}{\mathcal{L}_o}$$

where $\mathcal{L}_{ur}$ is the log-likelihood function of the estimated (unrestricted) model, and $\mathcal{L}_o$ is the log-likelihood function of a model containing only the intercept (Wooldridge, 2009). Another measures have been suggested and are now used frequently as well,

such as Log likelihood, Bayesian Information Criterion (BIC), and Akaike Information Criterion (AIC). The information criteria are defined as follows:

$$AIC = -2\mathcal{L}_{ur} + 2 * K$$

$$BIC = -2\mathcal{L}_{ur} + K * lnN$$

where in each formula, N is the number of observations and K is the number of estimated parameters of the model including the constant (Greene, 2012).

When making the decision about the best performing model or specification, the highest values of Pseudo R-squared and Log likelihood, and the lowest values of BIC and AIC are desired. We have to keep in mind, however, that all of the measures are imperfect in one way or another. Both Pseudo R-squared and maximized log-likelihood are easily increased by adding more variables into the model. Thus, models with higher number of variables will always seem to "fit better" according to these measures. The information criteria – AIC and BIC – attempt to correct this shortcoming by imposing a "punishment" on the model size (second term in the formulas). This way, they are able to take into consideration a certain trade-off between fit and complexity. While there is no obvious advantage to one information criterion over the other, BIC imposes heavier penalty for the number of predictors and therefore leans toward simpler models (Greene, 2012).

Table 5.9 presents the summary of all four described goodness-of-fit measures reported for every specification estimated throughout the thesis. The comparison has to be made carefully because not all specifications can be assessed together. In the individual tax haven analysis and in the sectoral analysis sections, each specification works with slightly different dependent variable. Consequently, the goodness-of-fit measures are not directly comparable and they unfortunately have only limited informative value.

Much more useful is the comparison for the analysis of all tax havens as homogenous group, where all four specifications in each group have the same dependent variable. The table shows that in the first two groups, suggestions about the best-fitting model differ significantly between the Pseudo R-squared and the information criteria. In both groups, Pseudo R-squared establishes the specification with sector-specific dummy variables as the best fitting model. Additionally, the

maximized log likelihood is the highest for these models as well. But that occurs simply due to the fact that this specification contains the largest number of predictors. Therefore, the information criteria might be more appropriate for comparison. In the first group, the most abbreviated baseline model (without the Age variable) is considered as best-fitting the data according to both AIC and BIC. This is a bit surprising as only the firm-specific characteristics are taken into consideration in that specification. In the second group, the best fitting model is the one with aggregated sectors, again according to AIC as well as BIC.

Table 5.9: Comparison of goodness-of-fit measures

Specification	Pseudo R-squared	Log likelihood	BIC	AIC
All tax havens including NL:				
(1) Baseline model 1	0.0734	-2,795	4,515.181	4,469.278
(2) Baseline model 2	0.0771	-2,784	5,644.943	5,583.739
(3) Sector dummies	0.0891	-2,748	5,630.334	5,523.227
(4) Aggregated sectors	0.0880	-2,751	5,598.166	5,521.661
All tax havens excluding NL:				
(5) Baseline model 1	0.0639	-2,229	4,515.181	4,469.278
(6) Baseline model 2	0.0675	-2,220	4,517.535	4,456.331
(7) Sector dummies	0.0779	-2,195	4,525.759	4,418.652
(8) Aggregated sectors	0.0771	-2,197	4,491.009	4,414.504
Individual tax havens (sectoral level):				
(9) Netherlands	0.0716	-1,005	2,144.449	2,037.342
(10) Switzerland	0.0730	-950.7	2,036.417	1,929.310
(11) Cyprus	0.0673	-714.0	1,563.086	1,455.979
(12) Luxembourg	0.0906	-512.5	1,160.139	1,053.031
Individual tax havens (aggregated level):				
(13) Netherlands	0.0691	-1,007	2,111.182	2,034.677
(14) Switzerland	0.0714	-952.3	2,001.108	1,924.603
(15) Cyprus	0.0607	-719.1	1,534.651	1,458.146
(16) Luxembourg	0.0821	-517.3	1,131.157	1,054.652
Sectoral analysis:				
(17) High technology	0.0854	-76.35	229.9069	168.7027
(18) Medium-high technology	0.1200	-445.9	969.0584	907.8541
(19) Medium-low technology	0.0729	-484.2	1,045.537	984.3331
(20) Low technology	0.1330	-292.0	661.1999	599.9957
(21) Knowledge intensive services	0.0562	-879.7	1,836.536	1,775.332
(22) Less-knowledge intensive services	0.0827	-1,402	2,880.484	2,819.280
Sectoral analysis (aggregated level):				
(23) Manufacturing	0.1250	-1,029	2,134.924	2,073.720
(24) Service	0.0683	-1,998	4,073.823	4,012.619

Source: Author's computations

6 Conclusion

Tax havens continue to play an important role in the world economy. The issue of international tax planning and tax avoidance by multinational corporations around the world is persistent and very hard to combat. The uncovering of several cases of highly sophisticated tax planning and most recently the leak of the so called Panama Papers have brought tax havens into spotlight. And so, they continue to be at the forefront of international policy debates. Largely missing from these debates are studies concerning determinants of tax haven demand – specifically, the firm-specific factors that influence the demand. The motivation and incentives of companies that lie behind their decision to relocate to tax havens thus remain unexplored to a great extent, even though they are crucial for better understanding of the firms' behaviour.

The first thing to emphasize is the importance of analysing the tax haven demand in individual countries rather than large worldwide datasets. While the global overall analyses certainly do have their merit in comprehending the general aspects of firm behaviour when it comes to tax haven investment, these are unlikely to hold universally across the world. The motivation of companies to use tax havens, however, can differ significantly between countries and its exploration is crucial, as it explains the incentives behind the demand for tax haven operations. By aiming our focus at one particular country, our analysis might provide more detailed insight into the specifics of firm behaviour and prove more useful in helping create policies and strategies that would mitigate the use of tax havens on country level. The aim of this thesis, therefore, is to contribute to the slowly growing body of literature on this topic by examining the determinants of tax haven demand in the specific case of the Czech Republic. To the extent of our knowledge, the performed analysis is the first of its kind devoted to firms in the Czech Republic.

The main focus of the thesis is to analyse the impact of various firm-specific factors on the use of tax havens by Czech firms. Our analysis suggests that there is a positive relationship between the firm size, internationality, and profitability, and the likelihood of tax haven use. These findings are in line with the evidence found in recent research. The correlation between firm indebtedness and the use of tax haven

operations has been found positive as well. This goes against our initial expectations, but the result is consistent across almost all of the estimated specifications and thus can be considered as conventional for Czech firms. Also, this result suggests that Czech firms engage in profit shifting through the use of debt financing. The most unexpected result, however, was the apparent dominance of service firms in the propensity to use tax havens. On the other hand, R&D intensive firms were not as likely to use tax haven operations, which is in stark contrast with most of previous research.

Furthermore, our findings stress the importance of focusing on tax haven countries individually, as there exists a great deal of heterogeneity among the group. A separate analysis was conducted for each of the four major tax havens represented in our sample – the Netherlands, Switzerland, Cyprus, and Luxembourg. Our results suggest there are significant differences between the firms that are attracted to different tax havens, especially regarding the sector-specific characteristics. The analysis revealed that service firms are primarily attracted to Cyprus and the Netherlands, while manufacturing firms tend to prefer Switzerland and Luxembourg. Firms that choose Cyprus for tax haven use particularly stand apart from all other tax haven users, even in terms of firm-specific characteristics. As a consequence, we believe that a shift from treating tax havens as a homogenous group to examinations of individual tax haven countries is a step in the right direction and should definitely be encouraged in both further academic research and policy making. Focusing on tax havens individually might help with producing effective targeted measures to discourage specific types of firms from setting up operations in specific tax havens.

While the literature on the topic is swiftly increasing, there are still uncovered areas. Future research should focus predominantly on the cross-haven and cross-sector heterogeneity in the determinants of tax haven use. A shift from focus on R&D intensive industries to ordinary service businesses might be prudent as well. The findings of the thesis suggest policy makers should specifically target service firms when creating policies or targeted measures aimed at mitigating tax haven use. Since we found Czech service firms are more often engaged in the use of tax haven operations and they show significantly different pattern of tax haven investment from manufacturing firms, we believe they should be at the centre of attention. We also propose concentrating on debt financing as the method used for profit shifting by Czech firms.

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Appendix

Table A1: Correlation matrix of selected explanatory variables

	Age	Age^2	Ln assets	Ln debt ratio	Ln profitability	Ln no. of employees	Ln no. of comp. in cg	High technology	Medium-high technology	Medium-low technology	Low technology	Knowledge intensive services	Less-knowledge intensive services	Manufacturing	Service
Age	1														
Age^2	0.9662	1													
Ln assets	0.2741	0.2643	1												
Ln debt ratio	-0.2061	-0.1903	-0.1512	1											
Ln profitability	-0.0837	-0.0812	-0.1374	-0.1638	1										
Ln no. of employees	0.2544	0.248	0.5489	-0.0298	0.0176	1									
Ln no. of comp. in cg	0.0863	0.0802	0.4492	-0.0745	0.0754	0.3331	1								
High technology	0.0296	0.027	0.0504	-0.0377	0.0235	0.069	0.0366	1							
Medium-high technology	0.0706	0.0695	0.1411	-0.0363	0.0417	0.2106	0.0663	-0.0289	1						
Medium-low technology	0.0222	0.02	0.0459	-0.0244	0.0385	0.1267	-0.0022	-0.0355	-0.1018	1					
Low technology	0.0368	0.0368	0.0118	-0.0024	-0.0317	0.1098	-0.0319	-0.0272	-0.0781	-0.0958	1				
Knowledge intensive services	-0.0504	-0.0558	-0.1103	-0.0291	0.0985	0.0134	0.0578	-0.0451	-0.1292	-0.1586	-0.1217	1			
Less-knowledge intensive services	-0.0721	-0.0716	-0.0365	0.0731	-0.0516	-0.2482	-0.0181	-0.0812	-0.2327	-0.2856	-0.2192	-0.3628	1		
Manufacturing	0.086	0.0831	0.1356	-0.049	0.0396	0.2951	0.0283	0.1668	0.4782	0.5869	0.4504	-0.2702	-0.4867	1	
Service	-0.1091	-0.1126	-0.119	0.0502	0.0233	-0.2345	0.0257	-0.1139	-0.3267	-0.401	-0.3077	0.3956	0.7124	-0.6832	1

Source: Author's computations