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The Influence of Taxation on Corporate Group Structure

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Summary of Contents

| | |
|---|------------|
| Summary of Contents..... | II |
| Table of Contents..... | III |
| List of Figures | VI |
| List of Tables..... | VII |
| List of Abbreviations | IX |
| 1 Introduction | 1 |
| 2 Measuring Tax Attractiveness across Countries | 9 |
| 3 Analysis of the Tax Attractiveness Index | 51 |
| 4 Tax Attractiveness and the Location of German-Controlled Subsidiaries..... | 86 |
| 5 Conclusion..... | 145 |
| Appendix | 149 |
| References..... | 169 |

Table of Contents

| | |
|--|------------|
| Summary of Contents..... | II |
| Table of Contents..... | III |
| List of Figures | VI |
| List of Tables..... | VII |
| List of Abbreviations | IX |
| 1 Introduction | 1 |
| 2 Measuring Tax Attractiveness across Countries | 9 |
| 2.1 Introduction..... | 9 |
| 2.2 Survey of Existing Tax Measures | 12 |
| 2.3 Development of the Tax Attractiveness Index..... | 16 |
| 2.3.1 Components of the Tax Attractiveness Index | 16 |
| 2.3.1.1 Statutory Tax Rate | 17 |
| 2.3.1.2 Taxation of Dividends Received | 18 |
| 2.3.1.3 Taxation of Capital Gains..... | 21 |
| 2.3.1.4 Withholding Taxes..... | 22 |
| 2.3.1.5 EU Membership..... | 23 |
| 2.3.1.6 Loss Offset Rules..... | 24 |
| 2.3.1.7 Group Relief | 25 |
| 2.3.1.8 Double Tax Treaty Network..... | 26 |
| 2.3.1.9 Thin Capitalization Rules | 28 |
| 2.3.1.10 Controlled Foreign Corporation Rules | 31 |
| 2.3.1.11 Anti Avoidance Legislation..... | 33 |
| 2.3.1.12 Personal Income Tax Rate | 35 |

| | | |
|----------|---|-----------|
| 2.3.1.13 | Special Holding Regime | 36 |
| 2.3.2 | Construction of the Tax Attractiveness Index..... | 37 |
| 2.4 | Descriptive Statistics..... | 40 |
| 2.5 | Conclusion | 48 |
| 3 | Analysis of the Tax Attractiveness Index | 51 |
| 3.1 | Introduction..... | 51 |
| 3.2 | Regional Differences..... | 53 |
| 3.3 | Comparison between Tax Attractiveness Index and OECD Lists | 59 |
| 3.4 | Relation between Tax Attractiveness Index and Existing Tax Measures..... | 70 |
| 3.4.1 | Tax Attractiveness Index and Statutory Tax Rate..... | 70 |
| 3.4.2 | Tax Attractiveness Index and Effective Tax Rates | 78 |
| 3.5 | Conclusion | 84 |
| 4 | Tax Attractiveness and the Location of German-Controlled Subsidiaries..... | 86 |
| 4.1 | Introduction..... | 86 |
| 4.2 | Theoretical Background and Hypothesis | 91 |
| 4.3 | Data Description and Empirical Methodology | 96 |
| 4.3.1 | Tax Attractiveness Index..... | 96 |
| 4.3.2 | Firm Data | 101 |
| 4.3.3 | Econometric Approach..... | 108 |
| 4.3.3.1 | General Econometric Framework..... | 108 |
| 4.3.3.2 | Regression Equation | 110 |
| 4.4 | Results..... | 113 |
| 4.4.1 | Graphical Evaluation..... | 113 |
| 4.4.2 | Regression Results | 118 |

| | | |
|----------|--|------------|
| 4.5 | Robustness Tests and Further Analyses..... | 124 |
| 4.5.1 | Robustness Tests | 124 |
| 4.5.1.1 | Control for Outliers..... | 124 |
| 4.5.1.2 | Alternative Dependent Variables..... | 126 |
| 4.5.1.3 | Breakdown by Year | 134 |
| 4.5.2 | Further Analyses | 136 |
| 4.5.2.1 | Statutory Tax Rate and Location Decision..... | 136 |
| 4.5.2.2 | Decomposing the Tax Attractiveness Index | 138 |
| 4.6 | Conclusion and Limitations | 141 |
| 5 | Conclusion..... | 145 |
| | Appendix | 149 |
| A | Additional Analyses Chapter 2 | 150 |
| B | Additional Analyses Chapter 3 | 159 |
| C | Variable Definitions Chapter 4 | 162 |
| D | Econometric Framework Chapter 4..... | 164 |
| E | Additional Analyses Chapter 4 | 168 |
| | References..... | 169 |

List of Figures

| | |
|---|-----|
| Figure 2-1: Tax Attractiveness Index per Country | 47 |
| Figure 3-1: Tax Attractiveness Index – Regional Differences | 56 |
| Figure 3-2: Tax Attractiveness Index and OECD Listing | 66 |
| Figure 3-3: Tax Attractiveness Index and Statutory Tax Rate – Full Sample..... | 72 |
| Figure 3-4: Tax Attractiveness Index and Statutory Tax Rate – EU Countries | 76 |
| Figure 3-5: Tax Attractiveness Index and Effective Marginal Tax Rate 2005 | 79 |
| Figure 3-6: Tax Attractiveness Index and Effective Average Tax Rate 2005..... | 81 |
| Figure 3-7: Tax Attractiveness Index and Effective Average Tax Rate 2007..... | 83 |
| Figure 4-1: Distribution of <i>Number Subsidiaries</i> | 105 |
| Figure 4-2: Location of German-Controlled Subsidiaries | 115 |
| Figure 4-3: Location of German-Controlled Subsidiaries – Focus on Less-Frequented Countries..... | 117 |

List of Tables

| | |
|---|-----|
| Table 2-1: Tax Attractiveness Index | 38 |
| Table 2-2: Descriptive Statistics for Tax Factors | 41 |
| Table 2-3: Descriptive Statistics for Tax Attractiveness Index | 44 |
| Table 2-4: Tax Attractiveness Index per Country | 46 |
| Table 3-1: Tax Attractiveness Index – Regional Differences | 55 |
| Table 3-2: Tax Attractiveness Index and OECD Lists – Mean Value Differences..... | 61 |
| Table 3-3: Correlation between Tax Attractiveness Index and OECD Lists | 64 |
| Table 3-4: Tax Attractiveness Index and OECD Listing – Mean Value Differences | 68 |
| Table 3-5: Correlation between Tax Attractiveness Index and OECD Listing..... | 69 |
| Table 3-6: Tax Attractiveness Index and Statutory Tax Rate – Regression Outputs..... | 74 |
| Table 4-1: Tax Attractiveness Index per Country | 100 |
| Table 4-2: Descriptive Statistics..... | 107 |
| Table 4-3: Tax Attractiveness and the Location of Subsidiaries – Main Results..... | 119 |
| Table 4-4: Tax Attractiveness and the Location of Subsidiaries – Alternative Specifications..... | 123 |
| Table 4-5: Tax Attractiveness and the Location of Subsidiaries – Control for Outliers | 125 |
| Table 4-6: Tax Attractiveness and the Location of Subsidiaries – Alternative Dependent Variables | 127 |
| Table 4-7: Tax Attractiveness and the Location of Subsidiaries – Consolidated Subsidiaries..... | 131 |
| Table 4-8: Tax Attractiveness and the Location of Subsidiaries – Aggregated Country Analysis | 133 |

| | |
|--|-----|
| Table 4-9: Tax Attractiveness and the Location of Subsidiaries – Breakdown by Year | |
| | 135 |
| Table 4-10: Tax Attractiveness and the Location of Subsidiaries – Statutory Tax Rate | |
| | 137 |
| Table 4-11: Tax Attractiveness and the Location of Subsidiaries – Decomposing the | |
| Tax Attractiveness Index | 140 |

List of Abbreviations

| | |
|--------|--|
| AAL | anti avoidance legislation |
| abs. | absolute |
| CCCTB | Common Consolidated Corporate Tax Base |
| CEPII | Centre d'Etudes Prospectives et d'Informations Internationales |
| CFC | controlled foreign corporation |
| CG | taxation of capital gains |
| Cons. | consolidated |
| DAX30 | Deutscher Aktien Index (major German stock market) |
| DEU | Deutschland (Germany) |
| DIV | taxation of dividends |
| DTT | double tax treaty network |
| EBIT | earnings before interest and taxes |
| EEA | European Economic Area |
| e.g. | exempli gratia (for example) |
| et al. | et alii/a (and others) |
| EU | European Union |
| EUR | Euro |
| FDI | foreign direct investment |
| FE | fixed effects |
| GAAR | general anti avoidance rule |
| GDP | gross domestic product |
| GROUP | group relief |
| HOLD | holding regime |

| | |
|-----------|--|
| IBFD | International Bureau of Fiscal Documentation |
| i.e. | id est |
| L | likelihood |
| LCB | loss carry back |
| LCF | loss carry forward |
| Max. | maximum |
| MiDi | Microdatabase direct investment |
| mill. | million |
| Min. | minimum |
| N | number |
| No. | number |
| OECD | Organisation for Economic Co-operation and Development |
| OLS | ordinary least squares |
| PIT | personal income tax rate |
| R&D | research and development |
| rel. | relative |
| R.O.C. | Republic of China |
| Std. Dev. | standard deviation |
| STR | statutory tax rate |
| TAX | Tax Attractiveness Index |
| THIN | thin capitalization rules |
| UNCTAD | United Nations Conference on Trade and Development |
| U.S. | United States |
| USD | United States Dollar |

| | |
|-------|---|
| vs. | versus |
| WHT | withholding tax |
| WHTD | withholding tax on dividends |
| WHTDG | withholding tax on dividends to Germany |
| WHTI | withholding tax on interest |
| WHTIG | withholding tax on interest to Germany |
| WHTR | withholding tax on royalties |
| WHTRG | withholding tax on royalties to Germany |
| ZEW | Centre for European Economic Research |

1 Introduction

The advancing globalization of the world economy and the increasing integration of markets in recent years have led to an extensive expansion of companies across national borders. The reasons why firms establish subsidiaries in foreign countries and thus emerge as multinational enterprises are manifold. First, companies may locate production abroad as a strategy to enter foreign markets in contrast to producing at home and subsequently exporting the finished goods. The decision whether to place production entities in a foreign country is influenced by various non-tax factors, such as the size of the host market, differences in factor prices, distance from the parent country, and market-access motives (for detailed theoretical considerations, see, e.g., Helpman 1984, 1985; Markusen 1984, 1995, 2002; Markusen and Venables 1998; Buch et al. 2005). However, taxes might just as well play a role in multinationals' location decisions for real investment. The influence of taxation on corporate choices has been subject to a substantial body of empirical literature. Existing studies reveal that taxes have an impact on foreign direct investment in general (see Feld and Heckemeyer 2011; Devereux 2007; De Mooij and Ederveen 2003; Hines 1999, for comprehensive surveys) and on multinationals' location decisions for production in particular (see Buettner and Ruf 2007; Devereux and Griffith 1998).

Second, there is evidence that multinational enterprises establish intermediate group entities, such as holding or financial companies in third countries and set up affiliates in off-shore tax havens (see, e.g., Desai et al. 2006a) for tax purposes only. In this way, complicated group structures may arise (see, e.g., Drucker 2010; Collins 2011; Duhigg and Kocieniewski 2012; Craig 2013, for anecdotal evidence). Recently, the tax planning strategies of large multinational companies including subsidiaries in fiscal

paradises, such as the Cayman Islands, the British Virgin Islands, and Bermuda, but also in favorable European tax locations, such as the Netherlands, Ireland, and Luxembourg triggered an intense public discussion. Starting from the United States where global players achieved extremely low effective tax rates in latest years (see further, e.g., Bergin 2012; Browning 2011), the debate has reached Germany. Multinational enterprises are accused of conducting aggressive tax planning and hence, causing millions in lost tax revenue for the government (see, e.g., Kaiser 2013; Schäfer 2013; Schröder 2013). Though, the structures they have implemented do not constitute a violation of law, but multinationals make use of favorable tax provisions applied in certain jurisdictions in a legal way. Nevertheless, their tax saving models are heavily criticized. In this context, the Organisation for Economic Co-operation and Development (OECD) has launched its recent report targeting at preventing base erosion and profit shifting and hence, aiming at protecting tax revenues of high tax countries (see OECD 2013). However, empirical studies dealing with the phenomenon of tax planning and with tax factors leading to the formation of group units in favorable tax locations are scarce (see Mintz and Weichenrieder 2010, for an exception).

The reason why taxation has an influence on corporate decisions is that tax law has not been harmonized internationally so far. In contrast to the globalization of business activity, taxation is still a national matter remaining in the hands of the individual countries. As a consequence, various national tax laws exist alongside each other leaving companies operating in more than one jurisdiction with the risk of double taxation. Undoubtedly, efforts towards tax integration have been made in recent past. The number of bilateral double tax treaties concluded worldwide has increased tremendously since the 1990s (see UNCTAD 2010). Moreover, the OECD has

published common guidelines, for example, regarding transfer pricing (see OECD 2010). As a further measure, within the European Union (EU) supranational regulations, such as the Parent-Subsidiary-Directive as well as the Interest and Royalties Directive apply, abolishing withholding taxes on dividends, interest, and royalties. Additionally, the introduction of a Common Consolidated Corporate Tax Base (CCCTB) with the objective of reducing tax obstacles and defining a common set of rules for determining the tax base of firms operating in EU member countries is discussed at present (see, e.g., Oestreicher and Spengel 2007).

However, tax harmonization has not been achieved yet. Therefore, apart from the risk of double taxation, existing international tax differentials provide multinationals with the opportunity to reduce their overall group tax burdens and to optimize their effective tax rates. Fueling the international tax competition, certain jurisdictions, such as Switzerland even continue to actively structure their tax provisions with the aim of attracting companies, investments, and jobs (see, e.g., Shotter 2013).

The tax factors companies take into consideration for tax planning purposes and which hence might lead to establishing corporate entities in attractive tax locations are diverse (see, e.g., Eicke 2009; Endres et al. 2005). Apart from the statutory tax rate, for example, favorable group taxation schemes, participation exemptions for dividends and capital gains, and special holding regimes might play a role. However, as a tax measure to analyze the influence of taxation on location decisions, recent empirical studies either employ the statutory tax rate or model-based effective tax rates (see, e.g., Buettner and Ruf 2007; Hebous et al. 2011; Overesch and Wamser 2009, 2010). The public media primarily focuses on the statutory tax rate when comparing corporate taxation across countries as well (see, e.g., Isidore 2012; Rapoza 2011). Certainly, the statutory tax rate

has an important signaling function (see OECD 2001). However, tax base effects are completely disregarded, making the statutory tax rate an unsuitable proxy for a country's tax conditions in most cases. The approach of model-based effective tax rates developed by King and Fullerton (1984) and put forward by Devereux and Griffith (1999, 2003) tries to overcome this shortcoming by comprising certain tax base determinants, such as depreciation allowances and interest deductions. Still, many further rules of real-world tax systems, such as group taxation regimes, thin capitalization rules, or double tax treaty networks multinational enterprises apparently take into account are neglected.

The present thesis aims at contributing to existing literature dealing with the influence of taxation on location decisions of multinational enterprises. It is argued that corporate choices and, hence, a country's tax environment depend on a bundle of tax factors existing tax measures do not capture. Multinationals' location decisions, especially those for tax planning entities, may not be sufficiently explained by former tax measures focusing on very few tax rules that are primarily important for the location and volume of real investment. Thus, previous studies may have underestimated the effects of taxation on the activities of multinational companies. Hence, the objective of the present thesis is to provide deeper knowledge about the impact of taxation on multinational firms' location choices.

To address this issue, a three-step approach is chosen. First, a new tax measure, the *Tax Attractiveness Index*, is developed. This index summarizes 16 different tax factors, such as the taxation of dividends and capital gains, withholding taxes, the group taxation regime, the double tax treaty network, and thin capitalization rules, providing a

detailed picture of a country's tax environment. Particularly, the *Tax Attractiveness Index* reflects the tax planning opportunities a country offers.

Second, further analysis of the self-developed *Tax Attractiveness Index* is provided by revealing regional clusters in the index as well as in the application of certain tax rules. Moreover, the index is related to the *black* respectively *grey list* published by the OECD in the years 2000 and 2009 containing tax havens and countries offering harmful tax regimes (OECD 2000, 2009). In addition, the *Tax Attractiveness Index* is compared to the statutory tax rate and effective tax rates used in recent empirical studies.

Third, the *Tax Attractiveness Index* is applied as a tax measure in an empirical study analyzing the impact of taxation on the location decisions of multinational enterprises. It is investigated whether companies place (an increased number of) subsidiaries in countries offering favorable tax conditions. To be precise, exploiting a sample of German-controlled subsidiaries in 97 different host countries, on the basis of count-data regression models, the study examines whether a country's tax environment, as measured by the *Tax Attractiveness Index*, effects location decisions and, hence, the number of subsidiaries.

The research problem targeted in this thesis is relevant for different addressees. First, it is important for policy makers. The *Tax Attractiveness Index* makes it possible to rank countries according to the tax conditions they offer. From this, governments and politicians can compare their current tax position to other countries. Furthermore, from the conducted empirical analysis, they can learn which countries succeed in attracting foreign subsidiaries. In addition, the present thesis provides insight into the tax factors multinational enterprises consider being the most important in their location decisions.

Politicians might use this knowledge in regard to future tax reforms that may be targeted to enhance location attractiveness. Second, companies and consultants might benefit as the index allows identifying attractive tax locations that can be used for future tax planning purposes. Moreover, they get an impression of the location strategies other multinational enterprises apply. Third, international researchers can employ the *Tax Attractiveness Index* as a new tax measure in future studies aiming at analyzing the influence of taxation on corporate decisions.

The present thesis comprises five chapters, an introduction, three empirical studies, and an overall conclusion. A common list of references and appendices is provided at the end of the thesis. The next three parts, chapter 2, chapter 3, and chapter 4 are based on working papers by the authors Prof. Dr. Deborah Schanz and Sara Keller. Therefore, the first person plural is used to anticipate further development of the studies and submission to peer-reviewed journals. In the following, the three studies are summarized and acknowledgements for helpful comments and suggestions are added.

Chapter 2 is based on arqus-Working Paper No. 143 named “Measuring tax attractiveness across countries”. Chapter 2 of the present thesis is an extended version of the first four sections of the manuscript. The study develops a new tax measure – the *Tax Attractiveness Index* – reflecting the attractiveness of a country’s tax environment and the tax planning opportunities offered. Specifically, the *Tax Attractiveness Index* covers 16 different components of real-world tax systems, such as the statutory tax rate, the taxation of dividends and capital gains, withholding taxes, the existence of a group taxation regime, EU membership, loss offset provision, the double tax treaty network, thin capitalization rules, controlled foreign corporation (CFC) rules, anti avoidance legislation, and the existence of a holding regime. We develop methods to quantify each

tax factor. The *Tax Attractiveness Index* is constructed for 100 countries over the period 2005 to 2009.

We appreciate helpful comments and suggestions from Martin Jacob, Igor Goncharov, Martin Ruf, Maximilian André Müller, Caspar David Peter, Holger Theßeling, Robert Risse, Wolfgang Schön, Kai Konrad, and workshop participants at WHU – Otto Beisheim School of Management, Otto-von-Guericke University Magdeburg, Ludwig-Maximilians-University Munich, and the Max Planck Institute for Tax Law and Public Finance.

Chapter 3 is an extended version of section 5, section 6, and section 7 of arqus-Working Paper No. 143 named “Measuring tax attractiveness across countries”. The study provides further analysis of the *Tax Attractiveness Index*. Regional clusters in the index as well as in the application of certain tax rules can be observed. The evaluation of individual countries based on the index corresponds – but is not totally identical – with the OECD’s *black* respectively *grey list*. By comparing the *Tax Attractiveness Index* with the statutory tax rate, we reveal that even high tax countries offer favorable tax conditions. Hence, the statutory tax rate is not a suitable proxy for a country’s tax climate in any case since countries may set other incentives to attract firms and investments.

We appreciate helpful comments and suggestions from Martin Jacob, Igor Goncharov, Martin Ruf, Maximilian André Müller, Caspar David Peter, Holger Theßeling, and workshop participants at WHU – Otto Beisheim School of Management, Ludwig-Maximilians-University Munich, and the Max Planck Institute for Tax Law and Public Finance.

Chapter 4 of this thesis is based on arqus-Working Paper No. 142 named “Tax attractiveness and the location of German-controlled subsidiaries”. The paper analyzes whether taxation has an influence on the location decisions of multinational enterprises. As a tax measure, we employ the *Tax Attractiveness Index*. Our count data regression analysis is based on a novel hand-collected data set consisting of the subsidiaries of German DAX30 companies. Controlling for non-tax effects, we find that a country’s tax environment as measured by the *Tax Attractiveness Index* has a significantly positive effect on the number of German-controlled subsidiaries located there. Hence, our study implies that location decisions depend on a bundle of tax factors as captured by the index. In a second step, we show that the location decisions of German DAX30 companies cannot be explained by the statutory tax rate alone. In contrast, withholding taxes, double treaty networks, and special holding regimes seem to play a decisive role in location decisions. Previous studies examining only the influence of statutory tax rates may thus have underestimated the effects of taxation on the activities of multinational companies.

We appreciate helpful comments and suggestions from Martin Jacob, Igor Goncharov, Martin Ruf, Maximilian André Müller, Caspar David Peter, Holger Theßeling, Robert Risse, Wolfgang Schön, Kai Konrad, and workshop participants at WHU – Otto Beisheim School of Management, Otto-von-Guericke University Magdeburg, Ludwig-Maximilians-University Munich, and the Max Planck Institute for Tax Law and Public Finance.

2 Measuring Tax Attractiveness across Countries¹

2.1 Introduction

With increasing globalization, countries are competing for companies, investment, and jobs. Due to the fact that tax law has not been harmonized internationally so far, a country's tax conditions represent an important location factor. A large body of empirical literature confirms that taxation has an influence on the location, investment, and financing decisions of multinational enterprises (see the surveys by Hines 1997, 1999; Devereux 2007). As a proxy for a country's tax environment, many different tax measures have been used in the past. Though, most recent empirical studies either rely on the statutory corporate income tax rate or on model-based effective tax rates (see, e.g., Devereux and Griffith 1998; Buettner and Ruf 2007; Hebous et al. 2011). However, we argue that corporate decisions and, hence, a country's tax attractiveness depend on a bundle of tax factors existing tax measures do not capture. Therefore, this paper develops a new tax measure – the *Tax Attractiveness Index* –including 16 different tax components providing a comprehensive picture of a country's tax environment.²

In early empirical literature, average tax rates have been applied to analyze the effect of taxation on the investment decisions of multinational enterprises (see Devereux 2007; Feld and Heckemeyer 2011, for an overview). The public media (see, e.g., Rapoza 2011; Isidore 2012) as well as current empirical literature investigating the

¹ This chapter is based on Keller, S. and Schanz, D. (2013), "Measuring tax attractiveness across countries", arqus-Working Paper No. 143, available from: www.arqus.info. This chapter is an extended version of the first four sections of the working paper.

² In other contexts, the application of indices is widely accepted. A famous example is the creditor rights index introduced by La Porta et al. (1998) that has been applied in many subsequent articles (see, e.g., Djankov et al. 2007; Spamann 2010). In the sense of Hung (2000), Jacob and Goncharov (2012) construct a tax accrual index that counts accrual norms codified in tax law.

location decisions of multinational enterprises, however, focus on the statutory tax rate when comparing corporate taxation across countries (see, e.g., Buettner and Ruf 2007; Overesch and Wamser 2009, 2010; Hebous et al. 2011). There is no doubt that the statutory tax rate has an important signaling function (see OECD 2001). However, due to the fact that it neglects tax base effects it is an unsatisfactory proxy in most cases. To overcome this shortcoming at least partially, more sophisticated tax measures reflecting effective tax burdens by capturing certain tax base determinants, such as depreciation allowances and interest deduction, have been developed (see King and Fullerton 1984; Devereux and Griffith 1999, 2003; Jacobs and Spengel 1999) and applied in empirical studies (see, e.g. Slemrod 1990; Devereux and Griffith 1998). Still, many further rules of real-world tax systems, such as group taxation regimes, thin capitalization rules or double tax treaty networks that might be relevant for corporate decisions have not been considered yet. We try to address this issue. Developing the *Tax Attractiveness Index* which summarizes 16 different tax factors, we create a new, transparent tax measure providing a detailed picture of the tax environment a country offers. Specifically, the *Tax Attractiveness Index* covers the statutory corporate tax rate, the taxation of dividends and capital gains, withholding taxes, membership in the European Union (EU), loss offset provisions, the group taxation regime, the double tax treaty network, thin capitalization rules, controlled foreign corporation (CFC) rules, anti avoidance legislation, the statutory personal income tax rate, and the existence of a special holding regime. Hence, the index particularly reflects a country's tax planning opportunities. It comprises components a substantial body of mainly practice-oriented literature identifies as being relevant for cross-border tax planning strategies (see, e.g., Eicke 2009; Endres et al. 2005). Therefore, in contrast to existing tax measures, the *Tax*

Attractiveness Index may also explain multinationals' location decisions for intermediate affiliates, such as holding companies³ or similar tax planning entities.

Since many of the tax components we regard are qualitative in nature, we develop methods for quantifying them. For the purpose of the index, all tax factors are restricted to values between zero and one. In each case, a value of one indicates the optimum (e.g., a statutory tax rate of 0%; the possibility of cross border group relief; no thin capitalization rules) while a value of zero signifies least favorable tax conditions (e.g., the highest statutory tax rate in the sample; no group relief; the existence of thin capitalization rules). Adding values for all single tax factors and dividing the sum by 16 yields us the country-specific *Tax Attractiveness Index*. Consistent with the single tax factors, the index varies between zero and one with high values indicating an attractive tax environment. The index is measured on an annual basis for 100 countries over the 2005 to 2009 period.

The *Tax Attractiveness Index* enables us to compare tax environments across different countries. We find that off-shore tax havens⁴, such as Bermuda, the Bahamas, the Cayman Islands, the British Virgin Islands, and the Netherlands Antilles achieve highest index values. Certain European countries, such as Luxembourg, the Netherlands, Ireland, Malta, Cyprus, Austria, and Belgium also offer favorable tax conditions as reflected by high index values. In contrast, Germany obtains an index

³ The term *holding company* is not clearly defined yet. Though, a holding company is understood as a legal entity that usually does not perform operative business activities, but whose main purpose is holding and managing shareholdings in other subsidiaries. A holding company may be set up for strategic reasons, such as the regional bundling of shares. However, it is also an important tax planning tool which may be used to achieve tax advantages (see, e.g., Eicke 2009; Endres et al. 2005).

⁴ The term *tax haven* is not clearly defined. According to the latest version of the OECD grey list from 18 May 2012, only Nauru and Niue constitute tax havens. However, for the purpose of this paper, countries that do not levy income taxes at all primarily located in the Caribbean are regarded as tax havens. Though, it can be argued that also certain European countries, such as Luxembourg, Switzerland, Ireland, and the Netherlands are tax havens.

value only slightly exceeding the sample average, while values for Japan and the United States are very low.

Our research is relevant for three groups of addressees: policy makers and governments, companies and consultants, and researchers. Policy makers and governments can use the *Tax Attractiveness Index* to compare their current tax position to other countries. They can learn about tax incentives competing countries create in order to attract investors. Companies and consultants might benefit as the index allows identifying attractive tax locations which can be used for future tax planning purposes. International researchers can employ the *Tax Attractiveness Index* as a new tax measure capturing more dimensions than existing tax measures in future studies regarding international tax differences.⁵

The remainder of the paper is organized as follows: the next section describes existing tax measures and shows the gap the *Tax Attractiveness Index* tries to fill. Section 3 presents all single index components and illustrates why they are relevant for a country's tax attractiveness. Moreover, it sheds light on what the application of different tax factors is like across countries and it demonstrates how quantification schemes are developed. Furthermore, section 3 explains how the index is constructed. Section 4 discusses descriptive statistics of the index and its components. Section 5 concludes.

2.2 Survey of Existing Tax Measures

In the past, a bunch of different tax measures has been applied as a proxy for a country's tax climate. Early studies examining the influence of taxation on foreign

⁵ Chapter 4 of the present thesis contains the first application of the *Tax Attractiveness Index*. It is analyzed whether taxation has an influence on the location decisions of German multinational enterprises (see Keller and Schanz 2013b).

direct investment (FDI) make use of macroeconomic average tax rates (for pioneering work, see Hartman 1984). These *backward-looking* measures are computed as total tax payments divided by a measure of profits. As they are based on actual taxes paid after tax deductions and after corporate tax planning, they may directly depend on investment activity. As a consequence, such implicit tax rates cause the problem of endogeneity in empirical analysis (see Devereux 2007).⁶

To overcome this shortcoming, *forward-looking* tax rates based on neoclassical investment theory have been developed (see Hall and Jorgenson 1967). The underlying idea is to determine the effective tax burden of a hypothetical, standardized investment project taking the statutory corporate tax rate as well as certain tax base determinants, such as depreciation allowances, valuation of inventories, and interest deduction into consideration. The basic framework, put forward by King and Fullerton (1984), reflects the influence of taxation on an investment just earning the cost of capital. This effective marginal tax rate can be interpreted as the proportionate difference between the pre-tax rate of return and a given post-tax required rate of return. However, recent literature claims that the effective marginal tax rate is not appropriate for an analysis of the effect of taxation on discrete investment choices, such as location decisions of multinational enterprises (see Devereux and Griffith 1998). Extending the approach of King and Fullerton (1984), Devereux and Griffith (1999, 2003) show that for the discrete choice of where to locate a subsidiary the effect of taxation on the total rather than the marginal investment project is decisive. They develop the effective *average* tax rate representing

⁶ For example, high investment levels may involve high depreciation allowances leading to a decreased tax liability and, therefore, to a negative correlation between taxation and investment. However, in such case, the direction of causation is inverted to what is intended to be analyzed. That is, instead of the level of investment reacting to taxation, the tax burden depends on investment (see Devereux 2007).

the tax burden on an investment yielding a higher rate of return than the marginal investment (see also Devereux et al. 2002).⁷

A further instrument that tries to measure the effective tax burden of different locations is the European Tax Analyzer developed by the Centre for European Economic Research (ZEW) and the University of Mannheim. In this approach, the effective average tax rate is derived by simulating the development of a model-corporation over a period of ten years. The effective tax burden reflects the difference between the pre-tax and the post-tax value of the model-firm at the end of the computer-based simulation period. Estimations take many periodical assumptions, for example, regarding production and sales, investment, costs of financing or depreciable assets into account (see, e.g., Oestreicher et al. 2009). In contrast to the effective tax rates calculated by Devereux and Griffith (1999, 2003), the model does not only include the statutory tax rate, but it accounts for all taxes relevant on corporate level, such as trade taxes, real estate taxes, and payroll taxes. Moreover, the European Tax Analyzer captures many different tax base determinants including depreciation, inventory valuation, research and development costs, employee pension schemes, and loss carry over (see, e.g., Jacobs et al. 2005).⁸ However, the computation is very complex, partly not transparent, and it has been done for only a limited number of countries so far.⁹ Moreover, especially tax factors relevant for cross-border corporate tax planning, such as group taxation regimes, double tax treaty networks, and CFC rules are still neglected.

⁷ The approach of King and Fullerton (1984) and Devereux and Griffith (1999, 2003) was subsequently applied by, for example, the OECD (1991) and the European Commission (1992, 2001).

⁸ The study conducted by the European Commission (2001) contains a comparison between the European Tax Analyzer and effective tax rates computed according to the King & Fullerton approach.

⁹ According to the ZEW, the effective tax burden has been computed for the 27 EU member states as well as the U.S. and Switzerland so far (see <http://www.zew.de/en/publikationen/taxation/eta.php>).

Abstracting from a country-specific perspective, Egger et al. (2009) use the methodology of Devereux and Griffith (1999, 2003) to compute bilateral effective tax rates taking host and home country taxation into consideration (see also Bellak et al. 2009).¹⁰ In a very recent study, Barrios et al. (2012) construct another form of bilateral effective tax rates. In contrast to Egger et al. (2009), their approach is not based on hypothetical investment projects in the parent company and the foreign subsidiary. They rather compute effective tax rates between 33 European countries by combining the statutory tax rate of the host country, the withholding tax rate imposed by the host country as well as the parent country tax rate depending on the treatment of foreign dividends in the parent country (exemption, credit, or deduction method). The approach of bilateral effective tax rates is very useful in empirical studies since it comprises cross-border tax parameters making analyses more precise. However, such tax measures do not allow comparing tax attractiveness across countries.

Another type of effective tax rates is calculated by Markle and Shackelford (2012). They use *accounting* effective tax rates based on micro-level financial statement information to compute effective tax rates per country. However, this proceeding is valuable for analyzing *ex post* tax burdens of multinationals depending on their locations, but similar to above mentioned *backward-looking* macroeconomic average tax rates it is not suitable for an *ex ante* analysis of the attractiveness of a country's tax environment. Furthermore, Graham (1996a, 1996b) develops a simulated corporate marginal tax rate based on Compustat tapes. It is defined as the present value of current and expected future taxes paid on an additional dollar of income earned today. However, it is based on U.S. tax law and, therefore, calculated for U.S. corporations

¹⁰ Previously, already Devereux and Freeman (1995) as well as, e.g., Cummins and Hubbard (1995) account for bilateral aspects. Slemrod (1990) and Bénassy-Quéré et al. (2005) additionally regard the method of international double taxation relief (exemption vs. credit countries).

only. Hence, it does not allow a cross-country comparison.¹¹ Ramb (2007) is first in calculating such a marginal tax rate for Germany.

Finally, a tax measure that is widely used in empirical studies (see, e.g. Buettner and Ruf 2007; Hebous et al. 2011; Overesch and Wamser 2009, 2010) as well as in cross-country comparisons of corporate tax burdens is the statutory tax rate (see, e.g., KPMG 2013; Isidore 2012; Rapoza 2011). Since it neglects tax base determinants it is an inappropriate proxy in most cases. However, the statutory tax rate is readily available and still has a strong signaling effect for the overall tax climate (see OECD 2001).

2.3 Development of the Tax Attractiveness Index

2.3.1 Components of the Tax Attractiveness Index

This paper develops a new, transparent tax measure, the *Tax Attractiveness Index*. The index includes a bundle of tax parameters determining a country's tax environment. In contrast to existing tax measures capturing only a small number of real-world tax components, the *Tax Attractiveness Index* covers 16 different tax factors especially reflecting the tax planning opportunities a country offers. Although it is a country-specific measure, the index comprises cross-border tax parameters, such as withholding taxes, group taxation regimes, and double tax treaty networks. However, unlike bilateral effective tax rates, the index does not refer to specific country pairs but keeps a unilateral perspective. Therefore, the *Tax Attractiveness Index* offers the opportunity to compare tax environments across countries and to evaluate given tax planning opportunities. All tax factors included and their respective characteristics described refer to the case of legally independent entities.

¹¹ The work of Graham is based on Shevlin (1990) and has been extended and improved by Blouin et al. (2010).

We construct the *Tax Attractiveness Index* for 100 countries over the 2005 to 2009 period. We obtain data on each tax factor from the *Global Corporate Tax Handbook* respectively the *European Tax Handbook* by the International Bureau of Fiscal Documentation (IBFD), PricewaterhouseCoopers' *Corporate Taxes – Worldwide Summaries* and *Individual Taxes – Worldwide Summaries*, Ernst & Young's *Worldwide Corporate Tax Guide*, Deloitte's *Taxation and Investment Guides*, KPMG's *Corporate Tax Rate Survey* and *Individual Income Tax Rate Survey*, and the OECD tax database. Whenever sources yield contradictory information, we rely on the source(s) that provide most details.

2.3.1.1 Statutory Tax Rate

As a first criterion, we include the statutory tax rate (*STR*) since it is an important determinant of a country's tax environment. By means of a low statutory tax rate, countries may try to attract firms and investment. Multinational enterprises have an incentive to shift profits (e.g., via transfer pricing or financing structures) into countries levying low statutory tax rates. In this way, they may decrease their overall group tax burden.¹² There is evidence that multinational companies even establish subsidiaries in off-shore tax havens that do not levy income taxes at all to use affiliates there as profit-shifting entities (see, e.g., Desai et al. 2006a, 2006b).

To capture all taxes corporate entities face, the statutory tax rate we include in the *Tax Attractiveness Index* combines the corporate income tax rate imposed by the central government as well as sub-central government taxes. The latter cover, for

¹² A sizeable body of empirical literature provides evidence for the influence of tax rates on the profit shifting activities of multinational enterprises (see, e.g., Grubert and Slemrod 1998; Hines and Rice 1994; Huizinga and Laeven 2008; Overesch 2009; Weichenrieder 2009). Studies concentrating on internal transfer prices to reveal the impact of taxation are, for example, Clausing (2001, 2003) and Bartelsman and Beetsma (2003).

example, U.S. state income taxes, Swiss cantonal taxes as well as regional trade taxes levied, inter alia, in Germany. In case those taxes vary across administrative units, we either use averages (e.g., for prefectural and municipal taxes in Japan) or figures of representative territorial communities (e.g., New York for the United States, Zurich for Switzerland). If progressive tax rates apply for either central or/and sub-central government taxes, we take the maximum tax rate into account. In Estonia and Macedonia no corporate income taxes are imposed. Instead, corporate tax payers are subject to a distribution tax levied on distributed profits. There are no taxes on retained earnings. In both cases, we do not assume that the statutory tax rate is zero, but we treat the distribution tax as statutory tax rate. In this way, we distinguish Macedonia and Estonia from tax havens which *de facto* levy a statutory tax rate of zero.

2.3.1.2 Taxation of Dividends Received

Next, we take the taxation of dividends received (*DIV*) into consideration. Within a multinational group, profits generated in one subsidiary may be transferred to another one or sent to the parent company. From the perspective of a multinational enterprise, it is favorable if profits can be transferred as easily as possible, that is, without causing further taxation. This guarantees a high degree of flexibility. However, if profits are distributed across borders, the danger of double taxation arises due to the fact that tax law has not been harmonized internationally so far. *De facto*, dividends have already been taxed as profits at the level of the distributing subsidiary. Many countries account for this fact when taxing dividends received: in several jurisdictions, a participation exemption applies meaning that dividends received from domestic and/or foreign affiliated companies are disregarded when determining taxable income. This is

an attractive feature of a country's tax environment. For corporate tax planning, a participation exemption is of particular significance. If, for example, a holding company shall be established in a third country in order to exploit advantageous tax provisions there, profits are not transferred directly from the operative unit to the parent company, but they are redirected through such intermediate unit. Hence, for the location decision of the holding company, the existence of a participation exemption is crucial. Otherwise, double or even triple taxation occurs.

We measure the taxation of dividends received by considering the extent to which dividends are tax exempt. Thereby, countries where dividends are not subject to tax at all (100% exemption) receive the value one ($DIV=1$). This is the case, for example, in Austria, the Netherlands, and Belgium. However, for example, in Germany, 5% of any dividends received are deemed to be non-deductible business expenditures. Hence, only 95% of the dividends can effectively be obtained free of tax ($DIV=0.95$). In most countries, the participation exemption is subject to certain requirements, such as a minimum participation (e.g., in the Netherlands, Spain, and Malta) or a minimum holding period (e.g., in Austria). For reasons of simplicity, we do not take these requirements into consideration, that is, the value for DIV implies that the requested conditions are satisfied.

Furthermore, there are countries where national tax provisions exempt only dividends received from other domestic subsidiaries (e.g., Argentina, Brazil, and Indonesia). However, we focus on cross-border transactions since they are decisive for international tax planning purposes. Hence, jurisdictions applying only a national participation exemption receive a value of zero ($DIV=0$). A value of zero is even given, if a tax credit on foreign profit taxes paid might be granted (e.g., in Argentina and

Egypt). If, however, the participation exemption is limited to foreign dividends received from subsidiaries resident in the European Union (this is the case, e.g., in Bulgaria, Poland, and Romania), we consider the prerequisites of an international participation exemption to be fulfilled ($DIV=1$). Moreover, for example, Australia and New Zealand explicitly exempt dividends received from non-domestic companies. These countries also receive the value one ($DIV=1$).

Another issue we account for when measuring the taxation of dividends received is the credit method some countries apply to avoid double taxation (e.g., the United States). In such cases, dividends are not tax exempt in the hands of the receiving company, but corporate taxes paid abroad can be credited against the domestic tax liability. Since the tax credit available is limited to the domestic tax level, the higher of the tax burden in the country of the affiliate and the one in which the parent company is located is decisive. If the country of the parent company levies higher taxes than the country of the affiliate, multinational enterprises have an incentive to defer repatriation of profits.¹³ As most countries applying the credit method maintain a comparatively high level of taxation, they do not offer favorable tax conditions for dividends received. Therefore, in case the credit method applies, DIV equals zero, even though a tax credit is available to mitigate double taxation ($DIV=0$).

Moreover, we take the fact that several tax regimes are based on the territoriality principle into consideration, that is, companies are subject to tax on their domestic-source income only (e.g., in Bolivia, Costa Rica, and Panama). Therefore, dividends received from foreign corporations are not subject to tax, although dividends received from resident companies might be included in the taxable income. Since our focus is on

¹³ See, e.g., Hines (1999) for a detailed description of the U.S. credit system.

cross-border transaction, countries applying the territoriality principle receive a value of one ($DIV=1$).

2.3.1.3 Taxation of Capital Gains

Furthermore, we incorporate the taxation of capital gains (CG) into the *Tax Attractiveness Index*. Similar to the taxation of dividends, the taxation of capital gains causes double taxation. The reason is that capital gains include retained earnings or expected future income of the divested company. As in the case of dividends, especially for tax planning entities in third countries the tax exemption of capital gains is crucial. However, also for holding companies set up for real business purposes, such as central companies used to pool participations (e.g., in case a U.S. parent company establishes an EU regional holding), the taxation of capital gains is highly important. Thus, in many countries the participation exemption applying to dividends is extended to capital gains (e.g., in Germany, Malta, and Austria). On the contrary, other jurisdictions do not make an effort to avoid double taxation. In such countries, capital gains are treated as ordinary income and taxed at the statutory tax rate (e.g., in the Slovak Republic, Japan, and South Korea).

According to the taxation of dividends, we quantify the taxation of capital gains by considering the extent of tax exemption. If capital gains are completely disregarded when determining taxable income, CG equals one. This is the case in, for example, New Zealand where capital gains are not subject to taxation by definition. Moreover, for example, in Nicaragua and Panama foreign capital gains are not included in taxable income due to the territoriality principle ($CG=1$). As in case of dividends, the participation exemption for capital gains might be dependent on certain conditions, such

as a minimum holding period (e.g., in France) or a taxation test (e.g., in Belgium). For example, in Australia, even a set of complex regulations applies.¹⁴ Again, we assume the respective requirements to be met. If countries differentiate between capital gains derived from domestic and those derived from foreign participations, we consider the cross-border case to be decisive.

In most countries, the deductibility of capital losses corresponds with the taxation of capital gains, that is, if capital gains are tax exempt, capital losses cannot be deducted. Accordingly, if capital gains are subject to taxation, capital losses are fully deductible. That is why we do not account for the treatment of capital losses as a separate criterion. Luxembourg represents an exception as capital losses and current value depreciations are tax deductible although capital gains are not subject to tax.

2.3.1.4 Withholding Taxes

As further tax factors, we include withholding taxes raised on dividends (*WHTD*), interest (*WHTI*), and royalties (*WHTR*). By means of withholding taxes, the source country tries to secure its share in tax revenue. However, from companies' perspective, withholding taxes are disadvantageous since in case of dividends, profits which have already been subject to corporate taxation are taxed again (in contrast to dividends not distributed across borders). If the receiving country exempts dividends from taxation (*participation exemption*), there is no possibility to offset the withholding taxes paid. Hence, the tax burden caused by withholding taxes cannot be reduced. In contrast, interest and royalties are generally subject to tax in the receiving country. However, if the source country levies withholding taxes, double taxation occurs. In

¹⁴ In Australia, capital gains on the disposal of shares in a foreign company that is held at least 10% by an Australian resident company may be partly or wholly disregarded to the extent that the foreign company has an underlying active business.

either case, a minimization of withholding taxes can be realized by means of bilateral double tax treaties aiming at reducing double taxation. Under certain double tax conventions, the contracting parties even agree not to levy withholding taxes at all.

However, we are not able to consider the withholding taxes agreed on in all double tax treaties signed between all sample countries. Therefore, we take the withholding tax rates constituted in domestic tax law into consideration. Low withholding taxes, of course, are an attractive location factor. For example, in the Slovak Republic, dividends are not subject to withholding tax, while Hungary does not impose withholding taxes on payments to foreign entities at all. We consider withholding taxes levied on dividends (*WHTD*), interest (*WHTI*), and royalties (*WHTR*), respectively. In case of interest and royalty payments, national legislation may include several exceptions, such as reduced rates on certain kind of interest or on royalties for films and television. We do not account for these exceptions, but we use the tax rates applied in usual cases.

2.3.1.5 EU Membership

Next, we comprise a dummy variable indicating whether a country is member of the European Union (*EU*). In this way, we account for the fact that within the EU, the Parent-Subsidiary Directive as well as the Interest and Royalties Directive apply. These abolish withholding taxes on dividends respectively on interest and royalties. Hence, dividends, interest, and royalties can be transferred free of withholding tax between two EU member countries. The scope of the directives has been extended to Switzerland. Therefore, in years 2005 and 2006, the 25 member countries and Switzerland receive a

value of one ($EU=1$). In 2007, Bulgaria and Romania entered the EU. Thus, in 2007, 2008 and 2009, EU equals one for 28 countries.

2.3.1.6 Loss Offset Rules

The next tax factors we take into account are a country's loss offset possibilities. Under such rules current losses can be used to either offset profits of previous periods by carrying losses back (LCB) or to offset future profits by carrying losses forward (LCF). In either way, companies can lower their tax burden. Hence, multinational enterprises perceive flexible loss compensation possibilities as being attractive. For a full picture of a country's loss treatment, we analyze the loss carry forward options (LCF) as well as the possibilities to carry losses back (LCB). With regard to the latter we make a distinction according to whether a loss carry back opportunity is available at all. Limitations in respect of the amount that can be carried back which apply, for example, in Germany, are not taken into account. Moreover, we disregard any time restriction which may be linked to loss carry back provisions. Thereby, for example, France where national tax law provides a loss carry back into the preceding three years and the Netherlands allowing only a one-year carry back period are treated in the same manner. Countries offering a loss carry back receive the value one ($LCB=1$) and for those where a loss carry back is not possible LCB equals zero.

The distinction we make regarding the loss carry forward is based on the number of years national tax law permits losses to be carried over into the future. Countries offering a loss carry forward of up to five years obtain the value zero ($LCF=0$), while for countries in which losses can be carried forward for more than five and up to twenty years LCF equals 0.5. Loss carry forward opportunities are most attractive if losses can

be used to offset profits far into the future. Thus, countries where losses can be carried forward indefinitely obtain a value of one ($LCF=1$). Again, we do not take limitations concerning the amount that can be offset into consideration (e.g., Austrian tax law contains such rule).

2.3.1.7 Group Relief

Furthermore, the *Tax Attractiveness Index* covers the availability of a group taxation regime (*GROUP*). Under such system, multiple subsidiaries belonging to the same corporate group are allowed to file a consolidated tax return. Thus, a loss from one group member can be transferred to another profitable one. In doing so, the overall tax burden of a corporate group can be lowered. Therefore, a group taxation regime is an attractive feature of a country's tax environment.

In many countries, tax consolidation regimes are restricted to domestic companies. Thereby, only group members situated in the same country are allowed to offset their profits and losses. Frequently, the formation of a tax group is even subject to the requirement that one of the participating companies serves as a domestic parent entity controlling the others and filing the consolidated tax return. Hence, in order to exploit a group taxation regime, it might be advantageous to establish a country holding as controlling unit which holds the majority of the voting rights in the other domestic group members.¹⁵ So far, only Denmark, France, Italy, and Austria offer international group relief schemes providing that losses can be transferred across borders. However, the judgment of the European Court of Justice in the Marks & Spencer case demands that countries which fall under the scope of EU law have to allow for an international

¹⁵ Oestreicher and Koch (2010) empirically analyze the determinants of forming a German tax group. They reveal that the introduction of the exemption method for corporate shareholders in 2001 has led to an increase in the probability of establishing a tax group.

tax consolidation regime in case of final losses (Case C-446/03 from 13 December 2005).

Evaluating tax consolidation regimes, we disregard certain requirements that may be linked to a group relief system. For example, in Germany a domestic parent company has to be established and a so-called *profit and loss pooling agreement* has to be entered into. According to the agreement, the subsidiary commits to transfer its entire profit to the parent company. Correspondingly, the parent has to absorb potential losses incurred by the subsidiary. In other countries, requirements regarding a minimum participation or a minimum holding period apply.

The classification we utilize to measure tax consolidation regimes is as follows: countries not allowing for a group relief scheme obtain a value of zero ($GROUP=0$), while for countries offering such system, but restricting it to domestic group members $GROUP$ equals 0.5. From the perspective of a multinational enterprise, regimes providing the possibility to offset *foreign* losses are most attractive. Hence, countries allowing for an international group relief system receive the value one ($GROUP=1$). The value one is obtained by Austria, Denmark, France, and Italy.

2.3.1.8 Double Tax Treaty Network

The next criterion we take into account is the double taxation treaty network (*DTT*) a country has established. Legally independent entities fall within the scope of tax law effective in their country of residence. That is why multinational companies operating subsidiaries in many different countries around the globe have to cope with a considerable number of national tax provisions. However, for example, if dividends are distributed across borders, the risk of double taxation arises since both, the source as

well as the receiving country might claim their right of taxation. To reduce or even prevent double taxation, two jurisdictions may conclude a double tax treaty. Dealing with different types of income (e.g., dividends, capital gains, business profits, interest, and royalties), such bilateral agreements assign the right of taxation to one of the contracting parties. Moreover, double tax treaties serve the purpose of reducing or even avoiding withholding taxes levied on distributed profits as well as on interest and royalty payments. In addition, double tax conventions often impose lower requirements for the granting of participation exemptions compared to national tax law.

Therefore, a broad treaty network is an important characteristic of a country's tax environment. It allows multinational enterprises to undertake business transactions with many other foreign countries without fearing double taxation. It might even be beneficial for multinational companies to set up a holding company in a country offering a comprehensive treaty network. Hereby, they get access to favorable tax rules they could not have exploited otherwise, such as reduced withholding taxes (*treaty shopping*).¹⁶

To quantify a country's treaty network, we count the number of double tax treaties in force per year. Double tax conventions which are under negotiation, but have not yet been ratified, are not taken into consideration. Even those that have been concluded, but are not yet in force, are disregarded. Furthermore, we do not account for *Tax Information Exchange Agreements* like those, e.g., the Netherlands Antilles has signed with several countries including Australia, Canada, Denmark, Mexico, and the United States.

¹⁶ Mintz and Weichenrieder (2010) are first in analyzing the phenomenon of *treaty shopping* empirically. They find that withholding taxes significantly increase the possibility of establishing an intermediate holding company in a third country.

2.3.1.9 Thin Capitalization Rules

Next, we regard the thin capitalization rules (*THIN*) a country imposes. In most countries, interest expenses are deductible for corporate tax purposes while dividends have to be paid out of profits *after* tax. Hence, there is a general incentive to prefer debt financing over equity financing. However, in contrast to companies acting only on national level, multinational enterprises have the opportunity to allocate their debts across countries in the most efficient way by means of internal financing strategies. The deductibility of interest expenses is perceived to be most valuable in high tax countries. Affiliates in low tax countries, however, may be equipped with equity.¹⁷ For tax planning purposes, it might be beneficial to establish an intermediate company in a low tax country to achieve a so-called *double dip* of interest deductions. In such case, the parent company borrows capital passing it to the intermediate company in the form of equity. The intermediate company, in turn, lends the capital to another subsidiary located in a high tax country. Hence, interest can be deducted twice, at the level of the high tax affiliate and at the level of the parent company while it is taxed at the low level of the intermediate group unit (see Mintz 2004).

To curb the intense use of debt financing, governments especially in high tax countries have adopted thin capitalization rules (see Buettner et al. 2012, for an empirical analysis). These rules aiming at limiting the deductibility of interest expenses from taxable income differ heavily across countries. Frequently, a full interest deduction is not possible in case the debt-to-equity ratio exceeds a certain threshold. In this case, interest payments connected with a high level of indebtedness cannot be offset for tax purposes. In the Netherlands, for example, corporations whose debt-to-equity ratio

¹⁷ A substantial body of empirical literature confirms that taxation has an impact on corporate financing decisions (see, e.g. Desai et al. 2004; Huizinga et al. 2008; Buettner et al. 2009).

exceeds 3:1 are subject to thin capitalization rules. If, however, the debt-to-equity ratio for the corporate group as a whole is above 3:1, a Dutch affiliate may be leveraged to the same extent. Although Dutch thin capitalization rules take third-party debt into consideration when calculating ratios, only the deduction of interest due on loans between *related* parties can be limited.

Similar to the Netherlands, other governments refer to related party debt when imposing thin capitalization rules. In Argentina, for example, interest is not deductible if a company's debt-to-equity ratio exceeds 2:1 and the interest is paid to a controlling banking or financial entity. Interest that is not deductible is re-characterized as a dividend. However, tax laws differ a lot in their definition of the term *related party* making it very difficult to compare rules across countries. Moreover, in several cases, thin capitalization rules are not only associated with related party loans but also refer to the place where the creditor is located. Japanese tax law, for example, restricts the deductibility of interest due on loans provided by foreign controlling shareholders or affiliates. Thereby, the above mentioned extensive foreign debt financing shall be avoided.

Furthermore, thin capitalization legislation may consist of more than one rule making a comparison with other tax laws even more complicated. Denmark serves as an example since three sets of rules are codified in national tax law.¹⁸ In many countries, companies can avoid being subject to thin capitalization rules if they fulfill certain conditions. For example, the German interest barrier can be circumvented if either the

¹⁸ In addition to the debt-to-equity ratio which may not exceed 4:1, an asset test limiting the deduction of interest expenses to a certain percentage of the tax value of the company's assets (6.5% in 2009) and an EBIT test limiting the deduction of net financing expenses to 80% of earnings before interest and tax apply.

exemption limit is not exceeded or the conditions of either the stand-alone clause or the escape clause are met. Italy applies similar rules.

To summarize, thin capitalization rules are quite complex and differ heavily across countries. Comparing the rules and making a general decision on which rules are perceived to be most attractive from a multinational's point of view is almost impossible. Therefore, we utilize a rather rough classification when measuring thin capitalization rules. For multinational enterprises, tax regimes which do not apply thin capitalization rules at all are most attractive as the allocation of debts is not restricted. Therefore, locations where the deductibility of interest is not limited receive the value one ($THIN=1$). These countries are, for example, Cyprus, Finland, Malta, and Thailand. Moreover, thin capitalization rules which are defined very narrow and whose application therefore is very unlikely, also obtain a value of one ($THIN=1$). Belgium and Switzerland serve as an example for such jurisdictions. Furthermore, in some locations thin capitalization rules are existent, but not clearly defined, that is, no official debt-to-equity ratio is provided. However, tax authorities are entitled to re-characterize certain transactions if they are considered as being excessive. For countries falling under this category, $THIN$ equals 0.5 (e.g., Austria, Bolivia, and Great Britain). Finally, governments imposing clearly defined thin capitalization rules are denoted with zero ($THIN=0$) since the existence of such rules is not an attractive feature of a tax environment. For reasons of simplicity, we neither differentiate between the various debt-to-equity ratios nor between any other characteristics that may be linked with thin capitalization rules.

2.3.1.10 Controlled Foreign Corporation Rules

A further tax factor, we take into consideration for the *Tax Attractiveness Index*, is the controlled foreign corporation rules (CFC) a country enforces. In general, foreign subsidiaries taking the form of a legally independent company are taxed in their country of residence. Profits may only be subject to taxation in the country of the parent company when being distributed as a dividend. However, this system leaves scope for abuse as multinational corporations are provided with incentives to generate income in low tax countries. For example, this can be realized by shifting intellectual property to tax havens and subsequently allocating the corresponding royalty payments there (see, e.g., Collins 2011; Drucker 2010, for anecdotal evidence). Thus, the tax haven entity does not execute operational activities but only generates passive income. As long as these profits are not distributed, they are kept away from the country in which the parent company is located enabling multinational companies to heavily decrease their tax burden.

To prevent the avoidance or the deferral of taxes due in the jurisdiction of the parent company, governments have established CFC rules overriding the system of protecting undistributed foreign profits from being taxed domestically. In other words, if the requirements of CFC rules are fulfilled, tax authorities are able to include undistributed income of corporations in foreign countries in the corporate tax base of resident parent companies. Hence, CFC rules protect the domestic tax base from erosion and secure tax revenue. In most countries, a tax credit is available for foreign taxes that have already been paid.¹⁹

¹⁹ Weichenrieder (1996) develops a model to analyze the impact of anti tax avoidance provisions. He finds that anti tax avoidance legislation distorts the portfolio choice of the foreign subsidiary and thus has an influence on capital allocation.

The conditions for CFC rules vary across countries. However, three main dimensions can be identified. First, CFC rules refer to foreign affiliates that are controlled or owned to a certain extent by resident companies. However, definitions of *control* differ a lot. In Canada, for example, it is sufficient if the domestic company owns at least 1% of the shares in the foreign corporation and in addition, the domestic company together with related persons directly or indirectly owns at least 10%. In contrast, for example, French CFC rules require a domestic participation of at least 50%. Moreover, the percentages of voting rights or the decisive influence might be taken into account when defining whether a foreign corporation is under control of domestic entities. Second, the activity or the income of the foreign corporation has to be of passive nature (such as dividends, interest, rent, and royalties). For this purpose, the question whether the assets of a subsidiary are of financial nature may be considered as well. Under Danish CFC rules, for example, a threshold of 10% applies, meaning a share of financial assets exceeding 10% is considered to be harmful. Third, CFC rules apply only in case the effective taxation of the foreign subsidiary is substantially lower than that of the home country. For example, Finnish CFC rules define that an effective tax rate of less than 60% of the Finnish corporate income tax rate of 26% (for 2009) is too low. In Japan, a foreign entity needs at least to be taxed at 25% not to be subject to CFC legislation. For Korean tax purposes, a low tax jurisdiction is a foreign country with an average effective tax rate of 15% or less. Some governments (such as Sweden and Lithuania) publish *white lists* containing countries whose tax regimes are generally not perceived as being harmful. In contrast, e.g., Italy issues a *black list* defining 71 countries and territories as tax havens. Under Portuguese CFC rules, a country is considered to be a low tax jurisdiction if it is included in a list of tax haven territories

provided by the Portuguese tax authorities. In some European countries, CFC legislation explicitly includes exemptions for controlled foreign corporations located within the European Economic Area (EEA) meaning such subsidiaries generally do not fall under the scope of CFC rules. Moreover, in many cases, CFC rules do not apply for countries a double tax treaty has been concluded with. Remarkably, the Italian *black list* still contains certain European territories including Malta, Cyprus, and Luxembourg. In addition, Sweden explicitly excludes Belgium, Estonia, Ireland, Luxemburg, and the Netherlands from its *white list*. Numerous CFC rules contain *safeguards* or *active clauses* giving the domestic company the chance to demonstrate the location of the foreign entity is not motivated solely by tax reasons. If the firm can prove that real business activities are carried out, CFC legislation does not apply.

Similar to the case of thin capitalization rules, it is hard to put CFC rules into categories since companies are affected differently by CFC regimes depending on their specific situation and strategy. Therefore, we simply differentiate between countries applying CFC rules and those who do not. If CFC rules are in force, they cause planning costs as well as administrative expenditures for firms irrespective of their specific design. This is why, from the perspective of a multinational enterprise, countries whose tax law does not contain CFC rules are perceived to be attractive. Hence, for such countries, *CFC* equals one. On the contrary, countries which apply CFC rules receive the value zero ($CFC=0$).

2.3.1.11 Anti Avoidance Legislation

As a further criterion, we include a country's anti avoidance legislation (*AAL*). In addition to CFC rules, the tax law of many countries includes further provisions

aiming at preventing abuse. By means of anti avoidance rules, tax authorities try to combat tax evasion and to challenge fictitious or artificial transactions. Anti avoidance legislation prohibits transactions whose primary or dominant purpose is the reduction of tax liability. Moreover, transactions which are solely carried out to obtain a tax benefit shall be prevented. In case a certain transaction falls under the scope of anti avoidance legislation, tax liability is determined without taking benefits resulting from the abuse into consideration. In other words, the tax burden is as high as it would have been if the abuse had not occurred. However, in almost all countries, companies are provided with the chance to prove that a transaction has been undertaken or arranged for real business purposes and not to artificially reduce tax liability.

The design of anti avoidance rules differs heavily across countries. As in the case of thin capitalization rules and CFC rules, we face the difficulty to convert verbally documented provisions into quantitative measures. Since certain tax planning schemes may be impeded by anti avoidance rules, the existence of such legislation is not favorable from a company's perspective. That is why countries where no anti avoidance rules are established (for example, Malaysia, Uruguay, and the Slovak Republic) receive the value one ($AAL=1$). However, in many jurisdictions, a general anti avoidance rule (GAAR) is codified determining that transactions have to be assessed according to their economic result. In this way, tax authorities have the right to ignore the legal form of a transaction if the economic substance is lacking. In case national tax law contains a general anti avoidance rule, the respective country obtains a value of 0.5 ($AAL=0.5$). However, there are countries in which a general anti avoidance rule is not explicitly codified in tax law. Nevertheless, the general substance-over-form principle is valid as it is applied by the courts. In such cases, AAL also equals 0.5. In doing so, we do not

distinguish between countries where the substance-over-form principle is explicitly documented in national tax code and countries where the principle applies without being codified.

Moreover, in some countries anti avoidance legislation does not only consist of a general anti avoidance rule, but includes further provisions amending the general rule. For example, in Italy, Portugal, and Brazil, a special anti tax haven legislation applies. In Germany, an anti treaty shopping rule is codified. Countries where a general rule plus special anti abuse clauses apply offer least attractive anti avoidance rules. That is why *AAL* equals zero for these jurisdictions.

2.3.1.12 Personal Income Tax Rate

Moreover, the *Tax Attractiveness Index* covers the personal income tax rate (*PIT*) a country levies. The personal income tax rate may be important as it determines the level of current taxation for the employees of a subsidiary. Therefore, multinational enterprises might take this criterion into consideration when evaluating a country's tax attractiveness. Measuring the current taxation of individuals, we take the statutory personal income tax rate imposed by the central government into consideration. If a progressive tax rate applies – which is the case in most countries – we include the maximum one. We account for sub-central taxes by either using averages (e.g., for Finland and Sweden) or by comprising the tax rate of a representative region (e.g., Zurich for Switzerland; Brussels for Belgium). We include other surcharges, such as solidarity surcharges imposed in Germany and Hungary, for example, only if precise numbers are available.

2.3.1.13 Special Holding Regime

Finally, we take the existence of a special holding regime (*HOLD*) into consideration. This is an attractive feature of a country's tax environment as it offers favorable conditions for holdings which might serve as a central tool in corporate tax planning strategies. The location decision for holding companies depends on multiple tax factors, most importantly, a participation exemption for dividends and capital gains, a wide treaty network, low withholding taxes, and a group taxation regime. However, certain countries try to enhance their tax position by offering special regimes for holding companies in order to attract subsidiaries. In Luxembourg, for example, a special holding regime was applied until 2010 which exempted holding companies from current taxation if certain requirements were met. Hence, the statutory tax rate for holding companies was zero. Similar rules exist in Lichtenstein. In Switzerland, holding companies are not subject to corporate income tax at the cantonal and communal level which lowers the statutory tax rate to approximately 7-8%. The Maltese income tax system contains a holding regime under which non-resident shareholders may claim a full refund of the tax paid by the company in Malta in case the related profits are distributed subsequently. In this way, the Maltese tax burden can be lowered heavily. Also Singapore operates a special holding regime. A company which qualifies as an approved holding is exempt from tax on all disposals of shares in subsidiaries. Although Singapore does not levy taxes on capital gains, gains on disposals of shares may be subject to corporate income tax if they are classified as income in nature. To provide greater certainty on the treatment of capital gains, approved holding companies can receive capital gains free of tax.

When evaluating a country's tax treatment of holding companies, we only take rules into account which have not been covered by one of the other tax factors included in the *Tax Attractiveness Index*. We differentiate between countries offering a special holding regime (*HOLD=1*) and those who do not (*HOLD=0*).

2.3.2 Construction of the Tax Attractiveness Index

In a next step, we use all 16 tax factors that have been identified as determining a country's tax environment to construct the *Tax Attractiveness Index*. Table 2-1 summarizes all index components and their respective measurement.

Table 2-1: Tax Attractiveness Index

Table 2-1 shows components of the *Tax Attractiveness Index* and their respective measurement. Each tax factor is measured on an annual basis and restricted to values between zero and one. *STR*, *WHTD*, *WHTI*, *WHTR*, and *PIT* are standardized by subtracting the tax rate country *i* levies in year *t* from the maximum sample tax rate in year *t* and subsequently dividing the resulting difference by the maximum sample tax rate in year *t*. *DTT* is standardized by dividing the number of double tax treaties country *i* has concluded in year *t* by the maximum sample number of double tax treaties concluded in year *t*. In all cases, a value of one indicates the optimum, that is, the most attractive characteristic of a tax factor. To construct the *Tax Attractiveness Index*, we add all tax factors and divide the sum by 16. Hence, the *Tax Attractiveness Index* represents an equally-weighted sum of 16 tax factors determining country *i*'s tax attractiveness in year *t*. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*.

| Tax Factor | Abbr. | Measurement | Weight |
|---|--------------|---|--------|
| (1) Statutory Tax Rate | <i>STR</i> | $(\text{Max. tax rate}_t - \text{tax rate}_{it})/\text{max. tax rate}_t$ | 1/16 |
| (2) Taxation of Dividends | <i>DIV</i> | Percentage of tax exemption | 1/16 |
| (3) Taxation of Capital Gains | <i>CG</i> | Percentage of tax exemption | 1/16 |
| (4) Withholding Tax Dividends | <i>WHTD</i> | $(\text{Max. tax rate}_t - \text{tax rate}_{it})/\text{max. tax rate}_t$ | 1/16 |
| (5) Withholding Tax Interest | <i>WHTI</i> | $(\text{Max. tax rate}_t - \text{tax rate}_{it})/\text{max. tax rate}_t$ | 1/16 |
| (6) Withholding Tax Royalties | <i>WHTR</i> | $(\text{Max. tax rate}_t - \text{tax rate}_{it})/\text{max. tax rate}_t$ | 1/16 |
| (7) European Union | <i>EU</i> | 1 - Member of the European Union 0 - Not member of the European Union | 1/16 |
| (8) Loss Carry Back | <i>LCB</i> | 1 - Loss carry back possible 0 - Loss carry back not possible | 1/16 |
| (9) Loss Carry Forward | <i>LCF</i> | 1 - Unlimited loss carry forward 0.5 - Loss carry forward > 5 y & ≤ 20 y 0 - Loss carry forward ≤ 5 years | 1/16 |
| (10) Group Relief | <i>GROUP</i> | 1 - Cross border group relief possible 0.5 - National group relief possible 0 - No group relief possible | 1/16 |
| (11) Double Tax Treaty Network | <i>DTT</i> | Number double tax treaties _{it} / max. number double tax treaties _t | 1/16 |
| (12) Thin Capitalization Rules | <i>THIN</i> | 1 - No thin capitalization rules apply 0.5 - Thin cap rules not clearly defined 0 - Thin capitalization rules apply | 1/16 |
| (13) Controlled Foreign Corporation Rules | <i>CFC</i> | 1 - No CFC rules apply 0 - CFC rules apply | 1/16 |
| (14) Anti Avoidance Legislation | <i>AAL</i> | 1 - No anti avoidance legislation applies 0.5 - General anti avoidance rule applies 0 - GAAR + special rules apply | 1/16 |
| (15) Personal Income Tax Rate | <i>PIT</i> | $(\text{Max. tax rate}_t - \text{tax rate}_{it})/\text{max. tax rate}_t$ | 1/16 |
| (16) Holding Regime | <i>HOLD</i> | 1 - Holding regime applies 0 - No holding regime applies | 1/16 |

For the purpose of the index, all tax factors have to be constrained to values between zero and one. In cases we had to develop quantification schemes, the measurement of the respective tax factors has already been adjusted to this scale. However, the statutory tax rate, the three different measures for withholding taxes, the double tax treaty network, and the personal income tax rate are not yet restricted to values between zero and one. The statutory tax rate, the withholding taxes, and the personal income tax rate are standardized by subtracting the tax rate country i levies in year t from the maximum sample tax rate in year t and subsequently dividing the resulting difference by the maximum sample tax rate in year t (see Table 2-1). Thus, the lower the tax rate country i imposes, the more the fraction approaches one, indicating an attractive characteristic of country i 's tax environment. The double tax treaty network is standardized by dividing the number of double tax treaties country i has concluded in year t by the maximum sample number of double tax treaties concluded in year t . Hence, the more double tax treaties country i has signed, the more the fraction converges to one, indicating a favorable tax feature.

To construct the *Tax Attractiveness Index*, we add values for all 16 tax factors per country and divide the sum by 16. Hence, the index represents an equally-weighted sum of 16 tax factors. It indicates the attractiveness of a country's tax environment and the tax planning opportunities offered. Analogical to its components, the *Tax Attractiveness Index* is measured on an annual basis and restricted to values between zero and one. The more the index value approaches one, the more attractive is the tax environment of a certain country.

2.4 Descriptive Statistics

Table 2-2 reports descriptive statistics for the 16 tax factors collected for a sample of 100 countries over years 2005 to 2009. However, tax data for Belarus in year 2005 are not available. Hence, the number of observations amounts to 499.

Table 2-2: Descriptive Statistics for Tax Factors

Table 2-2 presents descriptive statistics for 16 tax factors that form the *Tax Attractiveness Index*. Each tax factor is measured on an annual basis and it is collected for a sample of 100 countries over years 2005 to 2009. For a detailed description of the respective measurement see Table 2-1. *STR* is the statutory tax rate (in unstandardized form). *DIV* represents taxation of dividends and *CG* taxation of capital gains. *WHTD*, *WHTI*, and *WHTR* indicate withholding taxes on dividends, interest and royalties, respectively (in unstandardized form). *EU* indicates whether a country is member of the European Union. *LCB* and *LCF* denote loss carry back and loss carry forward opportunities. *GROUP* represents the possibility to file a consolidated tax return. *DTT* represents the double tax treaties concluded (in unstandardized form). *THIN* indicates thin capitalization rules and *CFC* indicates controlled foreign corporation rules. *AAL* represents anti avoidance legislation. *PIT* denotes the personal income tax rate (in unstandardized form). *HOLD* indicates the existence of a special holding regime.

| | Tax Factor | N | Mean | Std. Dev. | Min. | 25% | Median | 75% | Max. |
|------|------------|-----|---------|-----------|--------|--------|---------|---------|----------|
| (1) | STR | 499 | 0.2469 | 0.0978 | 0.0000 | 0.2000 | 0.2600 | 0.3000 | 0.4234 |
| (2) | DIV | 499 | 0.5755 | 0.4912 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 |
| (3) | CG | 499 | 0.4784 | 0.4907 | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 |
| (4) | WHTD | 499 | 0.1252 | 0.1097 | 0.0000 | 0.0000 | 0.1000 | 0.2000 | 0.3500 |
| (5) | WHTI | 499 | 0.1323 | 0.1035 | 0.0000 | 0.0000 | 0.1500 | 0.2000 | 0.4000 |
| (6) | WHTR | 499 | 0.1607 | 0.0966 | 0.0000 | 0.1000 | 0.1500 | 0.2200 | 0.3955 |
| (7) | EU | 499 | 0.2725 | 0.4457 | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 |
| (8) | LCB | 499 | 0.1804 | 0.3849 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 1.0000 |
| (9) | LCF | 499 | 0.4860 | 0.4490 | 0.0000 | 0.0000 | 0.5000 | 1.0000 | 1.0000 |
| (10) | GROUP | 499 | 0.1934 | 0.2819 | 0.0000 | 0.0000 | 0.0000 | 0.5000 | 1.0000 |
| (11) | DTT | 499 | 37.9299 | 29.6253 | 0.0000 | 9.0000 | 37.0000 | 60.0000 | 119.0000 |
| (12) | THIN | 499 | 0.6022 | 0.4674 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 |
| (13) | CFC | 499 | 0.7275 | 0.4457 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 |
| (14) | AAL | 499 | 0.5210 | 0.3057 | 0.0000 | 0.5000 | 0.5000 | 0.5000 | 1.0000 |
| (15) | PIT | 499 | 0.3021 | 0.1449 | 0.0000 | 0.2000 | 0.3200 | 0.4000 | 0.5900 |
| (16) | HOLD | 499 | 0.2545 | 0.4360 | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 |

The statutory tax rate, the three different measures for withholding taxes, the double tax treaty network, and the personal income tax are presented in unstandardized form. Table 2-2 reveals that the statutory tax rate has an average of 24.69% with a minimum of 0% representing the value for certain off-shore tax havens, such as the Cayman Islands, the Bahamas, and Bermuda. The maximum sample statutory tax rate is 42.34% indicating the value for Japan in 2008. Comparing the taxation of dividends and the taxation of capital gains, we see *DIV* is on average higher than *CG* showing that countries exempt dividends more often from taxation than capital gains. Descriptive statistics for the three different withholding taxes are very similar. However, the mean value for withholding taxes on royalties is highest. Maximum withholding taxes are levied by Argentina, Chile, and the Philippines (*WHTD*), Bangladesh (*WHTI*), and Columbia (*WHTR*). With respect to the loss carry over possibilities, it can be seen that only few countries permit a loss carry back as the mean value is 0.1804 with a median and an upper quartile value of zero. In contrast, most countries permit a loss carry forward of at least 5 years. A group taxation regime is offered by only a limited number of countries as indicated by a mean value of 0.1934 and a median of zero. Moreover, the sample countries have concluded approximately 38 double tax treaties on average per year. The maximum number of 119 treaties has been signed by France in years 2008 and 2009. With respect to anti abuse provisions, Table 2-2 shows that the application of a general anti avoidance rule is quite common as the mean, median as well as the upper and lower quartile values for *AAL* equal 0.5. However, thin capitalization and CFC rules are not that prevalent indicated by mean values of 0.6022 respectively 0.7275 and median values of one, respectively. The personal income tax rate is 30.21% on average with a maximum of 59% representing the value for Denmark in years 2005 to 2009.

Furthermore, only few countries offer a special regime for holding companies (mean value of 0.2545; median of 0). All tax factors show sufficient variation. Mean values per country for each of the 16 tax factors are reported in Table A.I in the appendix.

The correlation matrix in Table A.II in the appendix reveals that most index components are significantly correlated. However, only very few correlations are higher than 0.5. Still, the different measures for withholding taxes show high correlation coefficients among each other. Moreover, withholding taxes account for three out of 16 tax factors. Therefore, they represent a considerable part of the *Tax Attractiveness Index*. Furthermore, the anti abuse provisions (*THIN*, *CFC*, *AAL*) are highly correlated. To prevent the *Tax Attractiveness Index* from being driven by one group of related tax factors, we provide alternative specifications of the index. First, we summarize the withholding taxes (*WHTD*, *WHTI*, *WHTR*) meaning that the index consists of 14 components only (*Tax Attract. Index_I*). As a further alternative, we summarize the anti abuse provisions (*THIN*, *CFC*, *AAL*). In this specification, the index also covers 14 components only (*Tax Attract. Index_II*). Third, we combine *Tax Attract. Index_I* and *Tax Attract. Index_II*, that is, withholding taxes as well as anti abuse provisions are summarized herein (*Tax Attract. Index_III*). Hence, *Tax Attract. Index_III* comprises 12 components. Summary statistics for the *Tax Attractiveness Index* in its original version as well as for the alternative specifications are presented in Panel A of Table 2-3. Panel B of Table 2-3 reports correlations between the different index specifications. Above the diagonal, Pearson correlation coefficients are reported. Values for the Spearman rank correlation coefficient are presented below the diagonal. P-values are shown in parentheses.

Table 2-3: Descriptive Statistics for Tax Attractiveness Index

This table presents descriptive statistics for the *Tax Attractiveness Index*. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Panel A reports summary statistics for the *Tax Attractiveness Index*. *Tax Attract. Index_I* represents a modification of the index where the three different measures for withholding taxes (*WHTD*, *WHTI*, and *WHTR*) are summarized. Hence, *Tax Attract. Index_I* consists of 14 components only. *Tax Attract. Index_II* is another modification where all anti abuse provisions (*THIN*, *CFC*, and *AAL*) are summarized. Hence, *Tax Attract. Index_II* also consists of 14 components. *Tax Attract. Index_III* combines *Tax Attract. Index_I* and *Tax Attract. Index_II*, that is, withholding taxes (*WHTD*, *WHTI*, and *WHTR*) as well as anti abuse provisions (*THIN*, *CFC*, and *AAL*) are summarized. Hence, *Tax Attract. Index_III* consists of 12 components. Panel B reports correlations between different specifications of the index. Above the diagonal, Pearson correlation coefficients are reported. Values for the Spearman rank correlation coefficient are presented below the diagonal. P-values are shown in parentheses.

Panel A: Summary Statistics for Tax Attractiveness Index

| Variable | N | Mean | Std. Dev. | Min. | 25% | Median | 75% | Max. |
|--------------------------|-----|--------|-----------|--------|--------|--------|--------|--------|
| Tax Attractiveness Index | 499 | 0.4598 | 0.1573 | 0.0814 | 0.3438 | 0.4502 | 0.5408 | 0.8125 |
| Tax Attract. Index_I | 499 | 0.4370 | 0.1589 | 0.0866 | 0.3186 | 0.4258 | 0.5233 | 0.7857 |
| Tax Attract. Index_II | 499 | 0.4373 | 0.1652 | 0.0693 | 0.3150 | 0.4103 | 0.5463 | 0.7857 |
| Tax Attract. Index_III | 499 | 0.4071 | 0.1706 | 0.0733 | 0.2642 | 0.3873 | 0.5246 | 0.7500 |

Panel B: Correlation between Different Specifications of the Tax Attractiveness Index

| | Tax Attractiveness Index | Tax Attract. Index_I | Tax Attract. Index_II | Tax Attract. Index_III |
|--------------------------|--------------------------|----------------------|-----------------------|------------------------|
| Tax Attractiveness Index | 1 | 0.9897 (0.0000) | 0.9682 (0.0000) | 0.9394 (0.0000) |
| Tax Attract. Index_I | 0.9851 (0.0000) | 1 | 0.9637 (0.0000) | 0.9582 (0.0000) |
| Tax Attract. Index_II | 0.9553 (0.0000) | 0.9548 (0.0000) | 1 | 0.9861 (0.0000) |
| Tax Attract. Index_III | 0.9231 (0.0000) | 0.9476 (0.0000) | 0.9854 (0.0000) | 1 |

We can see that the different specifications of the index are highly correlated with each other (p-values < 0.0001). In addition, the summary statistics do not differ heavily. From this, we can conclude that the index is not affected by summarizing certain criteria or including them separately. It is neither driven by withholding taxes nor by anti abuse provisions. Therefore, in the following we use the *Tax Attractiveness Index* in its original version containing all 16 tax factors equally-weighted. The *Tax Attractiveness Index* has a mean value of 0.4598 and a median of 0.4502 indicating the variance is moderate. The index ranges between 0.0814 representing the value for Argentina in 2007 and 0.8125 representing the value for the Bahamas, Bermuda in years 2005 to 2009, and the British Virgin Islands in years 2006 to 2009.

Table 2-4 reports mean values of the *Tax Attractiveness Index* per sample country over years 2005 to 2009. Figure 2-1 corresponds with Table 2-4. On the abscissa, all 100 sample countries are entered in alphabetical order. On the ordinate, the average of the *Tax Attractiveness Index* over years 2005 to 2009 is plotted.

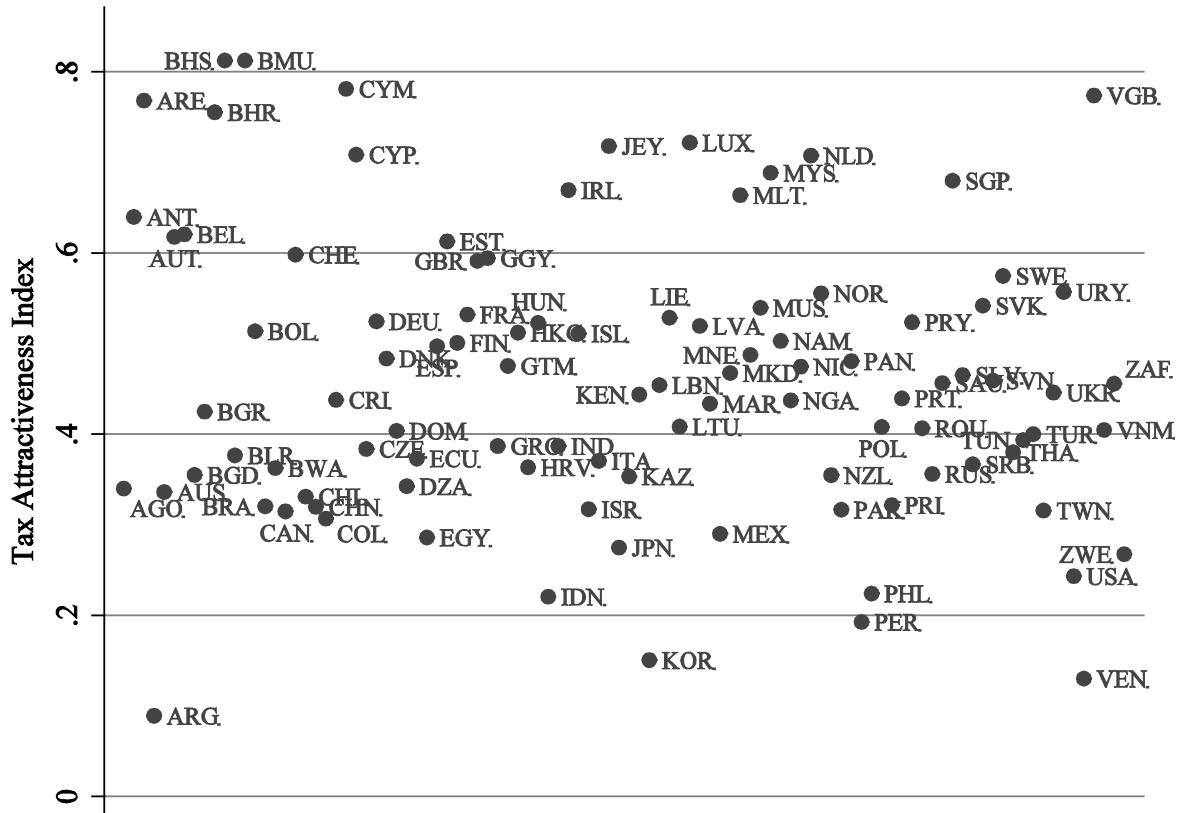
Table 2-4: Tax Attractiveness Index per Country

This table reports mean values of the *Tax Attractiveness Index (TAX)* per sample country over years 2005 to 2009. The *TAX* represents an equally-weighted sum of 16 tax factors. It is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers.

| Country (Code) | TAX | Country (Code) | TAX | Country (Code) | TAX | Country (Code) | TAX |
|---------------------------|--------|---------------------|--------|---------------------|--------|------------------------|--------|
| Algeria (DZA) | 0.3424 | Denmark (DNK) | 0.4835 | Korea (South) (KOR) | 0.1505 | Poland (POL) | 0.4079 |
| Angola (AGO) | 0.3399 | Dom. Republic (DOM) | 0.4036 | Latvia (LVA) | 0.5194 | Portugal (PRT) | 0.4395 |
| Argentina (ARG) | 0.0890 | Ecuador (ECU) | 0.3730 | Lebanon (LBN) | 0.4541 | Puerto Rico (PRI) | 0.3217 |
| Australia (AUS) | 0.3361 | Egypt (EGY) | 0.2859 | Liechtenstein (LIE) | 0.5286 | Romania (ROU) | 0.4065 |
| Austria (AUT) | 0.6178 | El Salvador (SLV) | 0.4652 | Lithuania (LTU) | 0.4083 | Russia (RUS) | 0.3560 |
| Bahamas (BHS) | 0.8125 | Estonia (EST) | 0.6128 | Luxembourg (LUX) | 0.7219 | Saudi Arabia (SAU) | 0.4564 |
| Bahrain (BHR) | 0.7554 | Finland (FIN) | 0.5008 | Macedonia (MKD) | 0.4675 | Serbia (SRB) | 0.3667 |
| Bangladesh (BGD) | 0.3550 | France (FRA) | 0.5320 | Malaysia (MYS) | 0.6886 | Singapore (SGP) | 0.6798 |
| Belarus (BLR) | 0.3765 | Germany (DEU) | 0.5245 | Malta (MLT) | 0.6639 | Slovak Republic (SVK) | 0.5419 |
| Belgium (BEL) | 0.6206 | Great Britain (GBR) | 0.5913 | Mauritius (MUS) | 0.5395 | Slovenia (SVN) | 0.4592 |
| Bermuda (BMU) | 0.8125 | Greece (GRC) | 0.3869 | Mexico (MEX) | 0.2899 | South Africa (ZAF) | 0.4557 |
| Bolivia (BOL) | 0.5137 | Guatemala (GTM) | 0.4753 | Montenegro (MNE) | 0.4875 | Spain (ESP) | 0.4971 |
| Botswana (BWA) | 0.3626 | Guernsey (GGY) | 0.5943 | Morocco (MAR) | 0.4336 | Sweden (SWE) | 0.5747 |
| Brazil (BRA) | 0.3203 | Hong Kong (HKG) | 0.5120 | Namibia (NAM) | 0.5030 | Switzerland (CHE) | 0.5981 |
| Brit. Virg. Islands (VGB) | 0.7739 | Hungary (HUN) | 0.5229 | Netherlands (NLD) | 0.7076 | Taiwan (TWN) | 0.3157 |
| Bulgaria (BGR) | 0.4248 | Iceland (ISL) | 0.5112 | Neth.Antilles (ANT) | 0.6398 | Thailand (THA) | 0.3800 |
| Canada (CAN) | 0.3147 | India (IND) | 0.3868 | New Zealand (NZL) | 0.3547 | Tunisia (TUN) | 0.3935 |
| Cayman Islands (CYM) | 0.7813 | Indonesia (IDN) | 0.2206 | Nicaragua (NIC) | 0.4746 | Turkey (TUR) | 0.4000 |
| Chile (CHL) | 0.3310 | Ireland (IRL) | 0.6694 | Nigeria (NGA) | 0.4373 | Ukraine (UKR) | 0.4460 |
| China (CHN) | 0.3197 | Israel (ISR) | 0.3171 | Norway (NOR) | 0.5555 | Unit. Arab Emir. (ARE) | 0.7682 |
| Colombia (COL) | 0.3067 | Italy (ITA) | 0.3705 | Pakistan (PAK) | 0.3166 | United States (USA) | 0.2432 |
| Costa Rica (CRI) | 0.4379 | Japan (JPN) | 0.2748 | Panama (PAN) | 0.4806 | Uruguay (URY) | 0.5570 |
| Croatia (HRV) | 0.3634 | Jersey (JEY) | 0.7181 | Paraguay (PRY) | 0.5236 | Venezuela (VEN) | 0.1301 |
| Cyprus (CYP) | 0.7086 | Kazakhstan (KAZ) | 0.3533 | Peru (PER) | 0.1927 | Vietnam (VNM) | 0.4046 |
| Czech Republic (CZE) | 0.3837 | Kenya (KEN) | 0.4437 | Philippines (PHL) | 0.2240 | Zimbabwe (ZWE) | 0.2675 |

Figure 2-1: Tax Attractiveness Index per Country

Figure 2-1 depicts mean values of the *Tax Attractiveness Index* per sample country over years 2005 to 2009. On the abscissa, all 100 sample countries are entered in alphabetical order. On the ordinate, the average of the *Tax Attractiveness Index* over years 2005 to 2009 is plotted. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*.



We reveal that countries which have been classified as tax havens in former literature (see OECD 2000; Hines and Rice 1994; Dharmapala and Hines 2009) achieve highest index values. These countries are the Bahamas (average index value of 0.8125), Bermuda (0.8125), the Cayman Islands (0.7813), and the British Virgin Islands (0.7739). They offer highly attractive tax environments because they do not levy income taxes at all. Moreover, some European countries obtain high index values. For example, Luxembourg (0.7219), Jersey (0.7181), Cyprus (0.7086), the Netherlands (0.7076), Ireland (0.6694), and Malta (0.6639) offer favorable tax conditions. Other countries having an attractive tax environment as indicated by high index values are the United Arab Emirates (0.7682), Bahrain (0.7554), Malaysia (0.6886), and Singapore (0.6798). In contrast, Argentina (0.0890), Venezuela (0.1301), and South Korea (0.1505) receive lowest index values. With respect to the leading industrial nations, Germany (0.5245), France (0.5320), and Great Britain (0.5913) exceed the sample average, while Japan (0.2748), the United States (0.2432), and Canada (0.3147) are far below.

2.5 Conclusion

This paper develops a new tax measure – the *Tax Attractiveness Index*. In a first step, we identify tax factors determining the attractiveness of a country's tax environment. Subsequently, we illustrate how different tax provisions are applied across countries and we develop methods for quantifying each tax factor. Finally, the index covers 16 different tax components, many of which have been neglected in existing tax measures so far. Hence, the *Tax Attractiveness Index* represents a new approach to measuring the attractiveness of a country's tax environment and the tax planning opportunities offered. We find that off-shore tax havens, such as Bermuda, the

Bahamas, and the Cayman Islands provide very favorable tax conditions as reflected by high index values. However, certain European countries, such as Luxembourg, Cyprus, the Netherlands, Ireland, and Malta also achieve high index values.

Our research has several implications: first, the *Tax Attractiveness Index* allows an evaluation of tax environments across countries. Hence, governments and politicians can compare their current tax position to other countries. Second, companies and consultants can use our research to identify favorable tax environments and tax planning opportunities. Third, the *Tax Attractiveness Index* can be employed by international researchers as a new tax measure in future studies. Since existing tax measures cover only a limited number of tax factors, the application of the *Tax Attractiveness Index* might yield further insights into the influence of taxation on the location, investment and financing decisions of multinational companies. Keller and Schanz (2013b) make use of the *Tax Attractiveness Index* to yield deeper knowledge about the impact of taxation on the location decisions of German multinational enterprises.

Nevertheless, our study suffers from certain limitations. First, although the *Tax Attractiveness Index* includes more tax factors than existing tax measures, it still does not capture *all* components of a tax system. For example, depreciation methods are neglected. Second, we do not manage to include all characteristics of certain tax factors. Complex requirements associated with several components are not taken into consideration. Instead, we use rather simplified measurement procedures in some cases. Moreover, the *Tax Attractiveness Index* summarizes the attractiveness of a country's tax environment in one figure. However, it depends on multinational companies' individual tax planning strategies which tax factors to take into account effectively.

Anyways, our developed index can still help governments and politicians, companies and consultants, and international researchers to gain new insights in the complex fields of taxation and taxation dependent decisions of multinational enterprises.

3 Analysis of the Tax Attractiveness Index²⁰

3.1 Introduction

The influence of taxation on corporate decisions has been widely analyzed and is subject to a substantial body of empirical literature (for an overview, see Hines 1997, 1999; Devereux 2007; Feld and Heckemeyer 2011). To specify a country's tax conditions, a number of different measures, such as macroeconomic average tax rates, model-based effective tax rates, and bilateral effective tax rates have been applied in previous studies (see, e.g., Hartman 1984; Devereux and Griffith 1998, 1999, 2003; Egger et al. 2009; Barrios et al. 2012). However, these measures capture only a limited number of real-world's tax provisions. To fill this gap, in the previous chapter of the present thesis, a new tax measure has been developed – the *Tax Attractiveness Index* summarizing 16 different tax factors. The dimensions included have been identified as determining multinational enterprises' location and investment choices (see, e.g., Eicke 2009). What sets the *Tax Attractiveness Index* apart from existing tax measures is the combination of a bundle of tax factors, such as thin capitalization rules, group taxation regimes, and the number of double tax treaties which have not been taken into consideration so far. Hence, the index yields a detailed picture of a country's tax environment and therefore offers new possibilities for analyzing the impact of taxation. The *Tax Attractiveness Index* is constructed for 100 countries over the period 2005 to 2009.

In this chapter, further analysis of the freshly developed index is provided. We reveal that the *Tax Attractiveness Index* significantly differs across geographical regions

²⁰ This chapter is based on Keller, S. and Schanz, D. (2013), "Measuring tax attractiveness across countries", arqus-Working Paper No. 143, available from: www.arqus.info. This chapter is an extended version of section 5, section 6, and section 7 of the working paper.

and we show that there are regional clusters in the application of certain tax rules. Furthermore, we validate the index by relating it to the *black* respectively *grey list* published by the OECD (see OECD 2000, 2009). We show the *Tax Attractiveness Index* corresponds with the OECD lists, that is, countries which are perceived as being harmful by the OECD reach significantly higher index values than others. However, we illustrate that certain countries have been removed from the OECD list although they keep offering extremely attractive tax environments. Moreover, we relate the *Tax Attractiveness Index* to the statutory corporate tax rate showing the latter is an unsuitable proxy for a country's overall tax environment. A comparison with effective tax rates used in recent empirical studies reveals they are not perfectly correlated with the *Tax Attractiveness Index*, either.

The objective of this study is to provide transparency and further insights about the *Tax Attractiveness Index*. This is especially important for international researchers. We aim at establishing the *Tax Attractiveness Index* as a transparent tax measure perceived as a reliable indicator for a country's tax conditions, useful in future research regarding the influence of taxation on corporate decisions. Moreover, governments as well as committees being responsible for international tax coordination and fighting against harmful tax competition can learn from our research that certain countries have not changed their tax conditions significantly, although they have been removed from the OECD list of harmful tax regimes. This leaves room for further discussion. Finally, companies and consultants can benefit as we reveal which countries and regions offer attractive conditions with respect to specific tax provision.

The remainder of the paper is organized as follows: the next section analyzes regional differences. Section 3 contains a comparison of the *Tax Attractiveness Index*

with the OECD lists published in 2000 and 2009 and in section 4, we relate the *Tax Attractiveness Index* to existing tax measures. The last section summarizes and concludes.

3.2 Regional Differences

To analyze whether the *Tax Attractiveness Index* differs significantly across regions and to investigate whether regional patterns of single tax factors can be observed, we divide our 100 sample countries into five geographical categories. We follow the classification of the World Bank. However, we summarize the categories *Sub-Saharan Africa* and *Middle East & Nord Africa* to *Africa & Middle East*. Moreover, we combine *North America* and *Latin America & Caribbean* to *Americas*. Though, we exclude the Caribbean countries to be able to examine them separately since their tax environments differ heavily from those of the other American countries. Furthermore, we summarize the World Bank's categories *South Asia* and *East Asia & Pacific* to *Asia-Pacific*. Our sample includes 41 European countries, 19 American countries, 6 Caribbean countries, 18 countries that are located in Africa & Middle East, and 16 countries that fall into the Asia-Pacific region. Panel A of Table 3-1 presents summary statistics for the *Tax Attractiveness Index* for each of the five geographical regions. Figure 3-1 shows average index values over years 2005 to 2009 across regions. It can be seen that the Caribbean and Europe achieve highest values. Correspondingly, Panel B of Table 3-1 shows mean value differences between regions. Values of the column are always subtracted from row values. Above the diagonal, p-values resulting from t-tests are reported in parentheses. Below the diagonal, we provide p-values resulting from Wilcoxon rank-sum tests in parentheses. Since the *Tax Attractiveness*

Index shows little within-country variation over time, cross-country differences are persistent. Therefore, we use mean values per country for the purpose of this analysis reducing the number of observations to 100. Taking all 499 observations into account would artificially increase levels of significance.

Table 3-1: Tax Attractiveness Index – Regional Differences

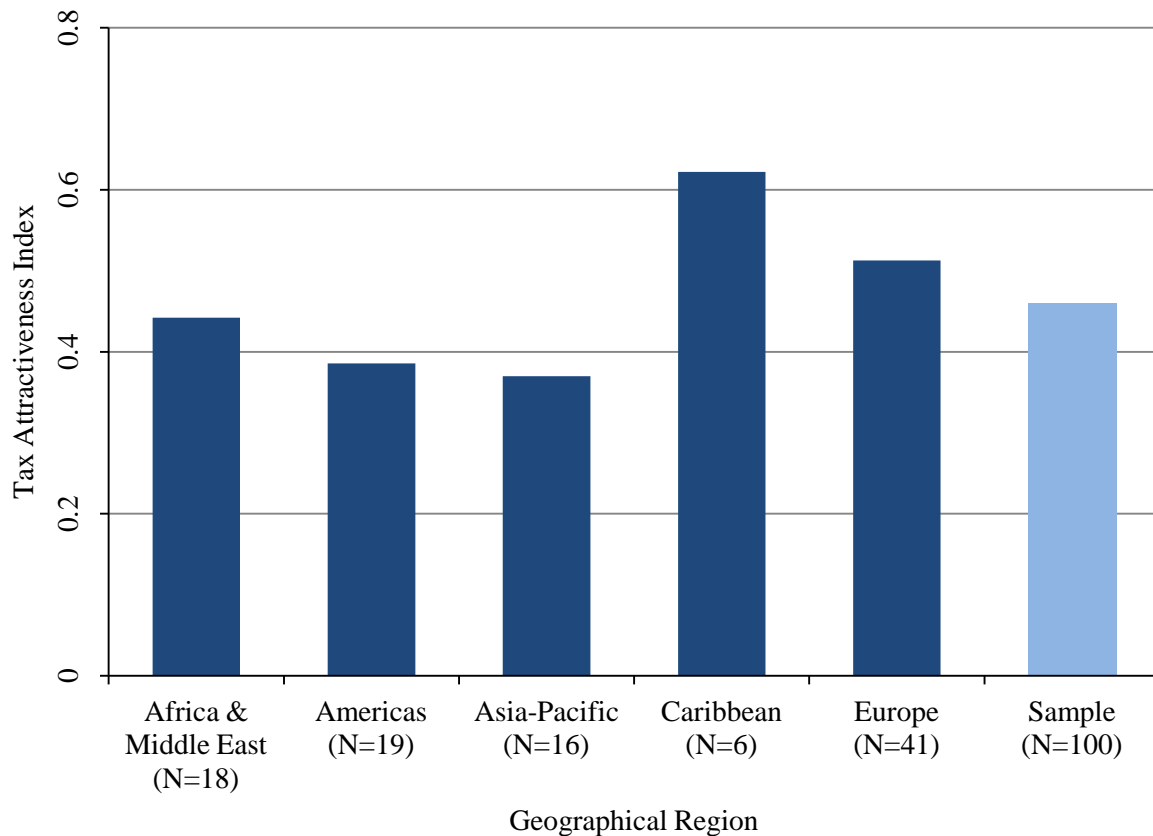
Table 3-1 shows differences in the *Tax Attractiveness Index* across geographical regions. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country’s tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. The 100 sample countries are divided into five different geographical regions. Panel A reports summary statistics for the *Tax Attractiveness Index* per region. Panel B reports mean value differences of the *Tax Attractiveness Index* between regions. Values of the column are always subtracted from row values. Above the diagonal, we provide p-values resulting from t-tests in parentheses. Below the diagonal, p-values resulting from Wilcoxon rank-sum test are reported in parentheses. Since the index shows little within-country variation over time, we apply mean values per country reducing the number of observations to 100.

| Panel A: Summary Statistics for Tax Attractiveness Index Across Regions | | | | | | |
|--|-----|--------|-----------|--------|--------|--------|
| Region | N | Mean | Std. Dev. | Min. | Median | Max. |
| Africa & Middle East | 18 | 0.4420 | 0.1371 | 0.2675 | 0.4354 | 0.7682 |
| Americas | 19 | 0.3858 | 0.1699 | 0.0890 | 0.3730 | 0.8125 |
| Asia-Pacific | 16 | 0.3700 | 0.1483 | 0.1505 | 0.3454 | 0.6886 |
| Caribbean | 6 | 0.6221 | 0.2111 | 0.3217 | 0.7069 | 0.8125 |
| Europe | 41 | 0.5127 | 0.1109 | 0.3533 | 0.5112 | 0.7219 |
| Total | 100 | 0.4596 | 0.1556 | 0.0890 | 0.4448 | 0.8125 |

| Panel B: Mean Value Differences for Tax Attractiveness Index Across Regions | | | | | |
|--|----------------------|---------------------|--------------------|---------------------|---------------------|
| | Africa & Middle East | Americas | Asia-Pacific | Caribbean | Europe |
| Africa & Middle East | | 0.0562 (0.2777) | 0.0720 (0.1510) | -0.1801 (0.0235) | -0.0707 (0.0406) |
| Americas | -0.0562 (0.4846) | | 0.0159 (0.7726) | -0.2363 (0.0100) | -0.1269 (0.0010) |
| Asia-Pacific | -0.0720 (0.0533) | -0.0159 (0.7157) | | -0.2522 (0.0048) | -0.1427 (0.0002) |
| Caribbean | 0.1801 (0.0719) | 0.2363 (0.0330) | 0.2522 (0.0150) | | 0.1094 (0.0531) |
| Europe | 0.0707 (0.0178) | 0.1269 (0.0018) | 0.1427 (0.0002) | -0.1094 (0.1704) | |

Figure 3-1: Tax Attractiveness Index – Regional Differences

Figure 3-1 shows differences in the *Tax Attractiveness Index* across geographical regions. The 100 sample countries are divided into five different geographical regions which are entered on the abscissa. On the ordinate, mean values of the *Tax Attractiveness Index* per region over years 2005 to 2009 are plotted. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Since the index shows little within-country variation over time, we apply mean values per country reducing the number of observations to 100.



It can be seen that the Caribbean countries offer most favorable tax conditions as reflected by the highest index value of 0.6221 on average. Differences between the Caribbean and all other regions are significant (p-values < 0.1).²¹ This can be explained by the fact that some of the Caribbean countries do not impose income taxes at all. Hence, they also obtain high values in most of the other tax factors we take into consideration since tax base determinants, such as loss carry over possibilities and thin capitalization rules do not play a role if the statutory tax rate is zero. Furthermore, anti abuse provisions rarely apply in the Caribbean region. In contrast, group taxation regimes are scarce. Moreover, the Caribbean countries do not have broad double tax treaty networks. On average, they have concluded only 0.67 double tax treaties.

European countries show index values (0.5127 on average) above the sample average of 0.4596 as well. Differences to other geographical regions are significant with the exception of the Caribbean (Wilcoxon rank-sum test). High index values arise since participation exemptions for dividends and capital gains are very common in Europe. In addition, members of the European Union can benefit both from the Parent-Subsidiary Directive and the Interest and Royalties Directive that abolish intra-EU withholding taxes. Furthermore, most European countries offer group taxation regimes. Austria, Denmark, France, and Italy even allow for a cross border group relief. Other important tax factors are the wide double tax treaty networks many European countries have established (on average 56.55 treaties per country) and the existence of special holding regimes in certain locations. In contrast, most European countries enforce rather strict anti abuse provisions.

²¹ Only the p-value resulting from a Wilcoxon rank-sum test for the mean value difference between the Caribbean and Europe is not significant.

The other three geographical regions do not differ significantly from each other. The mean value of the *Tax Attractiveness Index* for Africa & Middle East (0.4420) is slightly below the sample average. The sample countries located in this region suggest participation exemptions for dividends and capital gains are not very common in Africa & Middle East. Besides, loss carry over possibilities are poor. However, anti abuse provisions, especially thin capitalization rules and CFC rules do not apply frequently. American countries receive a mean index value of 0.3858. Less attractive tax conditions can be explained by the fact that withholding taxes are extremely high (on average, 12.29% on dividends; 19.67% on interest; 23.34% on royalties) and especially in South America the number of double tax treaties concluded is very low. In addition, most American countries neither offer favorable loss offset possibilities nor do group taxation regimes exist frequently. Countries located in Asia-Pacific offer least attractive tax environments as reflected by lowest mean values for the *Tax Attractiveness Index* (0.3700). In Asia-Pacific, the mean value of the statutory tax rates is highest (29.81%) and considerable withholding tax rates are imposed. Furthermore, dividends and capital gains cannot be received free of tax in most countries. Only Hong Kong, Malaysia, and Singapore exempt dividends and capital gains from taxation. In addition, countries in Asia-Pacific receive lowest values for all anti abuse provisions (*THIN*, *CFC*, *AAL*) on average. However, countries located there frequently offer group taxation regimes as well as comprehensive double tax treaty networks.

Our analysis reveals that the *Tax Attractiveness Index* varies across geographical regions although not all differences are significant.²² Moreover, regional clusters in the application of several tax provisions can be observed. Furthermore, we find that

²² If we do not use mean values per country over time, but include all 499 observations separately, mean value differences between all five geographical regions are significant.

countries forming part of the European Union show significantly higher index values (on average 0.5320) than those not belonging to the European Union (0.4314). Besides, mean index values differ significantly between countries offering special holding regimes (0.5989) and those who do not (0.4107). However, we do not find a significant difference between OECD (0.4708) and non-OECD countries (0.4548). Results are presented in Table B.I in the appendix.

3.3 Comparison between Tax Attractiveness Index and OECD

Lists

As a further analysis, we relate the self-constructed *Tax Attractiveness Index* to lists published by the OECD in 2000 and 2009 containing tax havens as well as jurisdictions identified as offering harmful tax regimes. We explore whether the *Tax Attractiveness Index* corresponds with the OECD's evaluations. Therefore, we investigate whether countries offering an attractive tax environment as reflected by high index values appear on the OECD list(s).

In its report published in 2000, the OECD identified 35 countries as tax havens (see OECD 2000).²³ Initially, this so-called *black list* contained 41 jurisdictions, however, Bermuda, the Cayman Islands, Cyprus, Malta, Mauritius, and San Marino were removed since they made formal *advance commitments* obliging them to eliminate their harmful tax practices and to follow the OECD principles. Nevertheless, these countries still met the tax haven criteria. Moreover, the OECD identified 47 potentially harmful preferential tax regimes in 21 different countries, such as the Belgian *Co-*

²³ In 1998, the OECD agreed on key factors to identify countries as tax havens. These criteria are: no or only nominal taxes, a lack of effective exchange of information, lack of transparency, and no substantial activities (see OECD 1998). Empirical studies identifying tax havens are consistent with the OECD list published in 2000 (see Hines and Rice 1994; Dharmapala and Hines 2009).

ordination Centers and the Irish *International Financial Services Center* (see OECD 2000). In addition, holding company regimes in 13 countries were characterized as constituting potentially harmful tax competition (see OECD 2000).

To compare the OECD's evaluation with the *Tax Attractiveness Index*, we introduce a dummy variable (*OECD List 2000*) assuming the value one if a country is either classified as a tax haven (including the six countries that issued an *advance commitment*), or identified as offering a preferential tax regime, or as providing a potentially harmful holding regime. Not all countries named in the OECD 2000 report form part of our sample. Hence, only 36 countries obtain the value one. Panel A of Table 3-2 reveals that countries appearing on the OECD list achieve significantly higher values for the *Tax Attractiveness Index* (0.5580 on average) than countries which are not listed (0.4042 on average). Again, we use mean values of the index over years 2005 to 2009 per country.

Table 3-2: Tax Attractiveness Index and OECD Lists – Mean Value Differences

This table reports differences in the *Tax Attractiveness Index* between sample countries appearing on the OECD lists published in 2000 and 2009, respectively, and those who do not. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Panel A reports mean value differences for the *Tax Attractiveness Index* between countries that appear on the OECD list published in 2000 and those who do not. Panel B presents mean value differences for the *Tax Attractiveness Index* between countries appearing on the OECD list published in 2009 and those who do not. Values of the column are always subtracted from row values. Above the diagonal, we provide p-values resulting from t-tests in parentheses. Below the diagonal, p-values resulting from Wilcoxon rank-sum tests are reported in parentheses. Since the index shows little within-country variation over time, we apply mean values per country reducing the number of observations to 100, respectively.

| Panel A: OECD List 2000 vs. Non-OECD List 2000 | | |
|---|---------------------------------------|---|
| | OECD List 2000 (N=36; Mean=0.5580) | Non-OECD List 2000 (N=64; Mean=0.4042) |
| OECD List 2000 (N=36; Mean=0.5580) | | 0.1537 (0.0000) |
| Non-OECD List 2000 (N=64; Mean=0.4042) | -0.1537 (0.0000) | |
| Panel B: OECD List 2009 vs. Non-OECD List 2009 | | |
| | OECD List 2009 (N=19; Mean=0.6072) | Non-OECD List 2009 (N=81; Mean=0.4250) |
| OECD List 2009 (N=19; Mean=0.6072) | | 0.1822 (0.0000) |
| Non-OECD List 2009 (N=81; Mean=0.4250) | -0.1822 (0.0000) | |

After 2000, all tax haven countries subsequently committed themselves to the internationally agreed tax standard. Hence, they were removed from the *black list* leading to the fact that in year 2009 no country was listed as an unco-operative tax haven any longer. The preferential tax regimes as well as the potentially harmful holding regimes were abolished, amended, or classified as being not harmful any longer. However, on the 2009 G20 London Summit, a new report was agreed on to be published by the OECD. This new progress report divided countries into three categories: first, jurisdictions that have substantially implemented the internationally agreed tax standard, second, jurisdictions that have committed to the internationally agreed tax standard, but have not yet substantially implemented, and third, jurisdictions that have not committed to the internationally agreed tax standard (see OECD 2009). In April 2009, 40 countries fell into the first category (*white list*). The second category was subdivided into tax havens (30 countries) and other financial centers (8 countries). Together with the third category (4 countries) it formed the so-called *grey list*. Hence, the *grey list* contained 42 jurisdictions. The *black list* was completely abolished.

We introduce a further dummy variable (*OECD List 2009*) assuming the value one if a country appears on the *grey list*. Thus, 19 of our sample countries receive the value one. All sample countries that either appear on the *white list* or are not named in the OECD report at all obtain the value zero. Until now, the OECD 2009 report has been updated several times. In its latest version from 18 May 2012, only three countries remain on the *grey list*. These are Nauru and Niue as tax havens, and Guatemala as financial center (see OECD 2012). Panel B of Table 3-2 reports differences in the *Tax Attractiveness Index* between countries that appear on the OECD 2009 *grey list* and those who do not. Jurisdictions on the OECD list 2009 on average receive significantly

higher index values (0.6072) than other sample countries (0.4250). Panel A of Table 3-3 presents correlations between the *Tax Attractiveness Index* and *OECD List 2000* as well as *OECD List 2009*, respectively. Our analysis reveals that both dummy variables are significantly positively correlated with the *Tax Attractiveness Index*. To control for the constant term, we run regressions with *OECD List 2000* and *OECD List 2009* as independent variables, respectively, and the *Tax Attractiveness Index* as dependent variable. Results – reported in Panel B of Table 3-3 – confirm that correlations between the index and the OECD lists are significantly positive. The *Tax Attractiveness Index* corresponds with the OECD’s evaluation. Countries appearing on the OECD list(s) and thus being perceived as harmful, offer extremely attractive tax environments as indicated by high index values.

Table 3-3: Correlation between Tax Attractiveness Index and OECD Lists

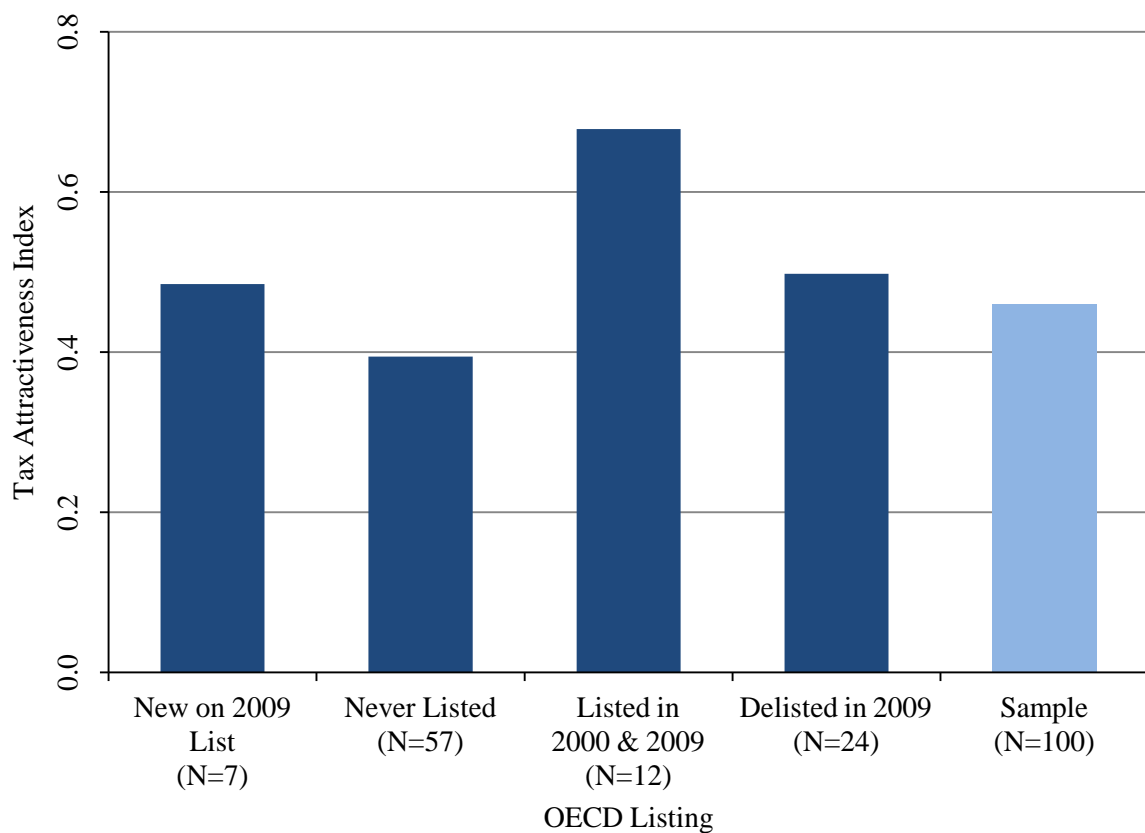
Table 3-3 shows the relation between the *Tax Attractiveness Index* and the OECD lists published in 2000 and 2009, respectively. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. *OECD List 2000* is a dummy variable indicating whether a country appears on the OECD list published in 2000. *OECD List 2009* is a dummy variable indicating whether a country appears on the OECD list published in 2009. Panel A reports correlations between the *Tax Attractiveness Index* and *OECD List 2000* and *OECD List 2009*, respectively. Above the diagonal, Pearson correlation coefficients are reported. Values for the Spearman rank correlation coefficient are presented below the diagonal. P-values are shown in parentheses. Since the index shows little within-country variation over time, we use mean values per country reducing the number of observations to 100, respectively. Panel B reports results from OLS regressions for the relation between the *Tax Attractiveness Index* and the OECD lists published in 2000 and 2009, respectively. The dependent variable is the *Tax Attractiveness Index*. The independent variable is *OECD List 2000* (column 1) respectively *OECD List 2009* (column 2). Standard errors (shown in parentheses) allow for heteroskedasticity. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| Panel A: Correlation Coefficients | | |
|--|--------------------------|--------------------------|
| | OECD List 2000 | Tax Attractiveness Index |
| OECD List 2000 | 1 | 0.4767 (0.0000) |
| Tax Attractiveness Index | 0.4821 (0.0000) | 1 |
| | OECD List 2009 | Tax Attractiveness Index |
| OECD List 2009 | 1 | 0.4618 (0.0000) |
| Tax Attractiveness Index | 0.4270 (0.0000) | 1 |
| Panel B: Regression Outputs | | |
| | Tax Attractiveness Index | |
| | (1) | (2) |
| OECD List 2000 | 0.1537*** (0.0308) | |
| OECD List 2009 | | 0.1822*** (0.0399) |
| Constant | 0.4042*** (0.0154) | 0.4250*** (0.0148) |
| Observations | 100 | 100 |
| R-squared | 0.2273 | 0.2132 |

To conduct further analysis, we simultaneously take both OECD lists into consideration. We divide our sample countries into four categories: countries appearing only on the 2009 list (*New on 2009 List*), countries that are never listed (*Never Listed*), countries appearing on both lists (*Listed in 2000 & 2009*), and those appearing only on the 2000 list (*Delisted in 2009*). Figure 3-2 displays mean values of the *Tax Attractiveness Index* for each category. It can be seen that jurisdictions which are constantly identified as being harmful by the OECD on average receive highest index values (0.6786). In contrast, countries that are never listed reach lowest values for the *Tax Attractiveness Index* on average (0.3944).

Figure 3-2: Tax Attractiveness Index and OECD Listing

Figure 3-2 displays the *Tax Attractiveness Index* for sample countries grouped according to their appearance on the OECD lists published in 2000 and 2009. We differentiate between countries that appear only on the 2009 list (*New on 2009 List*), countries that are never listed (*Never Listed*), countries that appear on both lists (*Listed in 2000 & 2009*), and those that only appear on the 2000 list (*Delisted in 2009*). These four different classifications are entered on the abscissa. On the ordinate, mean values of the *Tax Attractiveness Index* over years 2005 to 2009 are plotted. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country i offers in year t . Since the index shows little within-country variation over time, we apply mean values per country reducing the number of observations to 100.



To investigate whether the differences observed are statistically significant, we conduct t-tests as well as Wilcoxon rank-sum tests. Consistent with previous analyses, we use mean values per country to not artificially increase levels of significance. Results are presented in Table 3-4. We find that differences between countries which are always listed and all other categories are statistically highly significant. The same holds true for countries that are never listed. In contrast, differences between jurisdictions either appearing only on the 2000 or on the 2009 list are not significant. Furthermore, we analyze the relation between the *Tax Attractiveness Index* and the dummy variables *Listed in 2000 & 2009* and *Never Listed*, respectively. Results are presented in Table 3-5. In Panel A, correlation coefficients are reported and Panel B summarizes regression outputs. Confirming our results from analyzing both lists separately, *Listed in 2000 & 2009* is highly positively correlated with the *Tax Attractiveness Index*. In contrast, *Never Listed* is significantly negatively associated with the index.

Table 3-4: Tax Attractiveness Index and OECD Listing – Mean Value Differences

Table 3-4 reports differences in the *Tax Attractiveness Index* between sample countries grouped according to their appearance on the OECD lists published in 2000 and 2009. We differentiate between countries appearing only on the 2009 list (*New on 2009 List*), countries that are never listed (*Never Listed*), countries appearing on both lists (*Listed in 2000 & 2009*), and those only appearing on the 2000 list (*Delisted in 2009*). The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Values of the column are always subtracted from row values. Above the diagonal, we provide p-values resulting from t-tests in parentheses. Below the diagonal, p-values resulting from Wilcoxon rank-sum tests are reported in parentheses. Since the index shows little within-country variation over time, we use mean values per country reducing the number of observations to 100.

| | New on 2009 List (N=7; Mean=0.4848) | Never Listed (N=57; Mean=0.3944) | Listed in 2000 & 2009 (N=12; Mean=0.6786) | Delisted in 2009 (N=24; Mean=0.4977) |
|--|--|-------------------------------------|--|---|
| New on 2009 List (N=7; Mean=0.4848) | | 0.0904 (0.0649) | -0.1938 (0.0085) | -0.0129 (0.8461) |
| Never Listed (N=57; Mean=0.3944) | -0.0904 (0.1294) | | -0.2842 (0.0000) | -0.1033 (0.0010) |
| Listed in 2000 & 2009 (N=12; Mean=0.6786) | 0.1938 (0.0179) | 0.2842 (0.0000) | | 0.1809 (0.0007) |
| Delisted in 2009 (N=24; Mean=0.4977) | 0.0129 (0.7768) | 0.1033 (0.0012) | -0.1809 (0.0010) | |

Table 3-5: Correlation between Tax Attractiveness Index and OECD Listing

This table presents the relation between the *Tax Attractiveness Index* and the OECD lists published in 2000 and 2009. Both lists are simultaneously taken into consideration. *Listed in 2000 & 2009* is a dummy variable assuming the value one if a country appears on both lists. *Never Listed* is a dummy variable assuming the value one if a country is never listed. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Panel A reports the correlation between the *Tax Attractiveness Index* and *Listed in 2000 & 2009* respectively *Never Listed*. Above the diagonal, Pearson correlation coefficients are reported. Values for the Spearman rank correlation coefficient are presented below the diagonal. P-values are shown in parentheses. Since the index shows little within-country variation over time, we use mean values per country reducing the number of observations to 100, respectively. Panel B reports results from OLS regressions for the relation between the *Tax Attractiveness Index* and the OECD lists published in 2000 and 2009. The dependent variable is the *Tax Attractiveness Index*. The independent variable is *Listed in 2000 & 2009* (column 1) respectively *Never Listed* (column 2). Standard errors (shown in parentheses) allow for heteroskedasticity. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| Panel A: Correlation Coefficients | | |
|--|--------------------------|--------------------------|
| | Listed in 2000 & 2009 | Tax Attractiveness Index |
| Listed in 2000 & 2009 | 1 | 0.5224 (0.0000) |
| Tax Attractiveness Index | 0.4765 (0.0000) | 1 |
| | Never Listed | Tax Attractiveness Index |
| Never Listed | | -0.4852 (0.0000) |
| Tax Attractiveness Index | -0.4930 (0.0000) | |
| Panel B: Regression Outputs | | |
| | Tax Attractiveness Index | |
| | (1) | (2) |
| Listed in 2000 & 2009 | 0.2488*** (0.0347) | |
| Never Listed | | -0.1517*** (0.0290) |
| Constant | 0.4297*** (0.0145) | 0.5461*** (0.0248) |
| Observations | 100 | 100 |
| R-squared | 0.2729 | 0.2355 |

Our analyses reveal that the attractiveness of a country's tax environment as measured by the *Tax Attractiveness Index* corresponds with the evaluation conducted by the OECD in its 2000 and 2009 *black* respectively *grey list*. Sample countries appearing on the list(s) have significantly higher index values than others. However, there are certain exceptions. Panama forms part of both OECD lists, though, the country has an average index value of 0.4806 only slightly exceeding the sample average. Furthermore, Chile, Costa Rica, and the Philippines appear on the 2009 *grey list* although their index values are considerably low (on average 0.3310, 0.4379, and 0.2240, respectively). In contrast, countries offering highly attractive tax environments, such as Cyprus (mean index value of 0.7086), Guernsey (0.5943), Ireland (0.6694), Jersey (0.7181), Malta (0.6639), Mauritius (0.5395), the Netherlands (0.7076), and the United Arab Emirates (0.7682) appear on the 2009 OECD *white list* containing jurisdictions explicitly perceived as not being harmful. Malta, for example, was identified as a tax haven in the 2000 OECD report. Although, the index value increased from 0.5878 in 2005 to 0.7131 in 2009, the country was not perceived as being harmful in 2009 any longer. The same is true for Guernsey and Jersey. This gives rise to the assumption that certain countries were removed from the OECD list although their tax environments did not change significantly, but in contrast, remained extremely attractive.

3.4 Relation between Tax Attractiveness Index and Existing Tax Measures

3.4.1 Tax Attractiveness Index and Statutory Tax Rate

To analyze the relation between the self-constructed *Tax Attractiveness Index* and existing tax measures, we first compare the index to the statutory tax rate. The

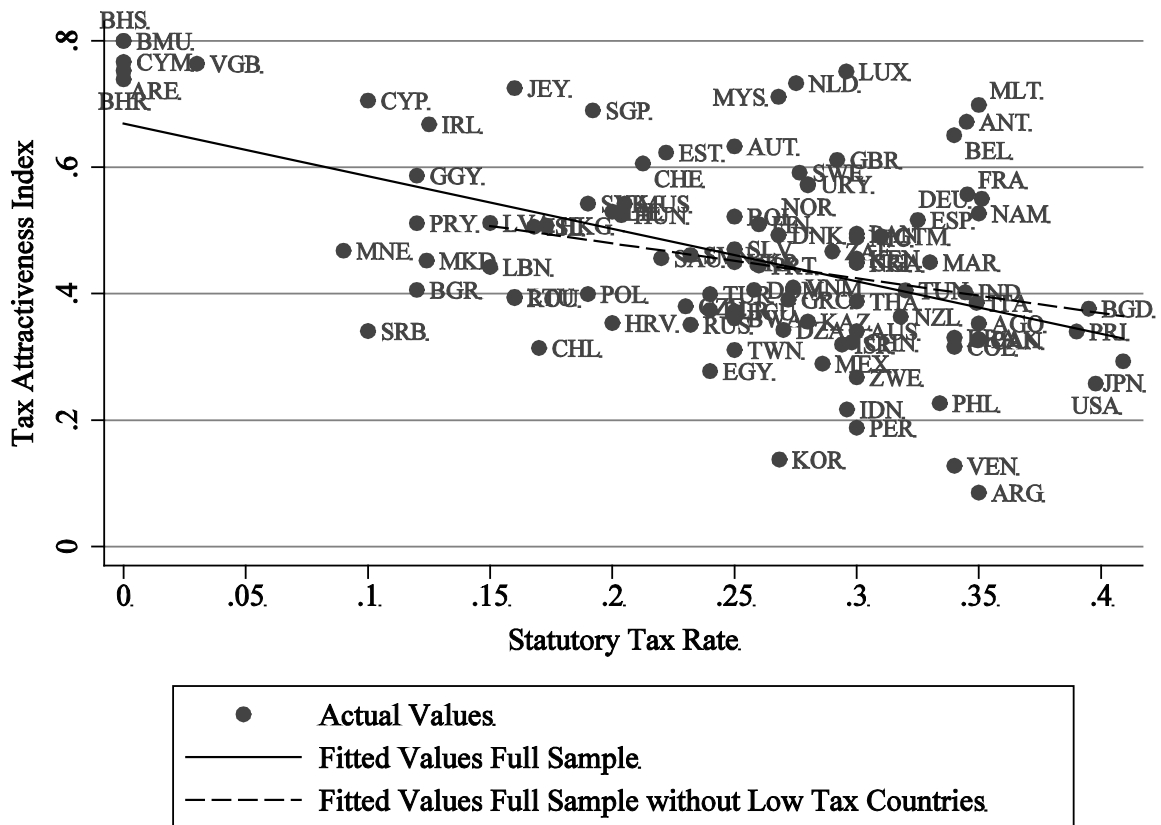
statutory tax rate is used as a tax measure in various empirical studies (see Buettner and Ruf 2007; Overesch and Wamser 2009, 2010; Hebous et al. 2011). Moreover, it is widely perceived as an indicator for a country's tax environment (see, e.g., Rapoza 2011; Isidore 2012; KPMG 2013). We explore whether this notion can be verified. Using our sample of 100 countries over years 2005 to 2009, we try to shed light on the question whether countries imposing a high statutory tax rate necessarily offer unfavorable tax conditions as reflected by the *Tax Attractiveness Index*. Possibly, countries set incentives other than the statutory tax rate to create a favorable tax climate and hence attract multinational enterprises. For the purpose of this analysis, we exclude the statutory tax rate from the *Tax Attractiveness Index* since it serves as independent variable. Thus, the index consists of 15 tax factors only.²⁴ As we use the statutory tax rate in unstandardized form, we expect it to be negatively associated with the *Tax Attractiveness Index*.

Figure 3-3 depicts the relation between the statutory tax rate and the index. We use mean values over years 2005 to 2009 for both variables. The solid line which is a linear fit to all sample countries reveals that the statutory tax rate and the *Tax Attractiveness Index* are negatively correlated. The higher the tax rate is, the lower is the index value. However, if low tax countries with a statutory tax rate of less than 15% are excluded, the relationship is less straightforward as indicated by the dashed line.

²⁴ The *Tax Attractiveness Index* in its original version and the *Tax Attractiveness Index* excluding the statutory tax rate are highly correlated with each other (0.9966; p-value < 0.0001).

Figure 3-3: Tax Attractiveness Index and Statutory Tax Rate – Full Sample

Figure 3-3 shows the relation between the *Tax Attractiveness Index* and the statutory tax rate. For the purpose of this analysis, we exclude the statutory tax rate from the index. Thus, the *Tax Attractiveness Index* is defined as an equally-weighted sum of 15 different tax factors determining a country's tax attractiveness. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Mean values of the statutory tax rate over years 2005 to 2009 are entered on the abscissa. On the ordinate, mean values of the *Tax Attractiveness Index* for this period are plotted. The solid line is a linear fit to all sample countries. The dashed line is a linear fit to sample countries with mean statutory tax rates of more than 15%.



Correspondingly, Table 3-6 presents regression outputs with the statutory tax rate as independent and the *Tax Attractiveness Index* as dependent variable. Since within-country variation over time is rather low, we use mean values per country.²⁵ Results in Panel A confirm the effects observed in Figure 3-3. If the full sample is considered, the index and the statutory tax rate are significantly negatively correlated. If, however, only countries with statutory tax rates of more than 15% are taken into account, the correlation is less significant.

²⁵ Table B.II in the appendix reports correlation coefficients.

Table 3-6: Tax Attractiveness Index and Statutory Tax Rate – Regression Outputs

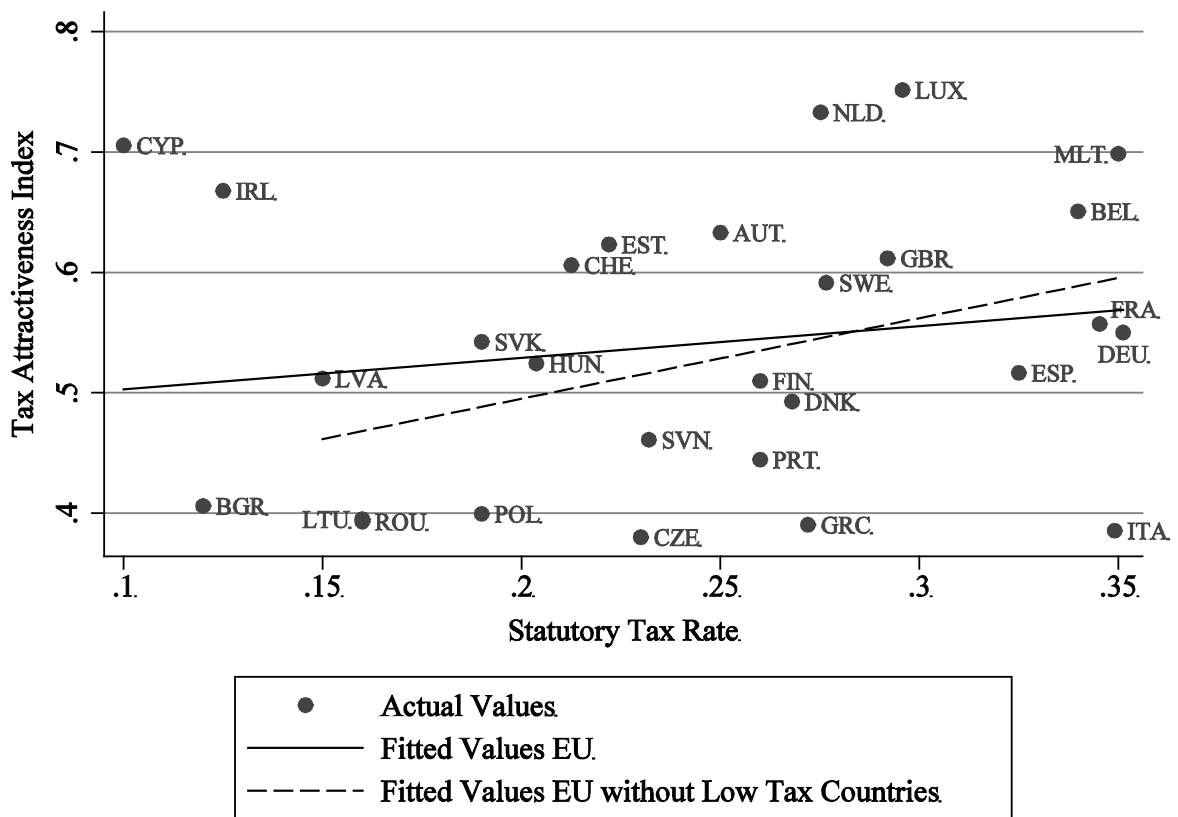
This table reports results from OLS regressions for the relation between the *Tax Attractiveness Index* and the statutory tax rate (*STR*). The dependent variable is the *Tax Attractiveness Index*, here defined as an equally-weighted sum of 15 different tax factors determining a country's tax attractiveness. For the purpose of this analysis, we exclude the statutory tax rate from the index. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. The independent variable is the statutory tax rate country *i* imposes in year *t*. Since both variables show little within-country variation over time, we use mean values per country over years 2005 to 2009 for the *Tax Attractiveness Index* as well as the statutory tax rate. Panel A reports regression outputs for the full sample. Panel B presents regression outputs for EU versus non-EU countries. EU countries are defined as those belonging to the EU in 2009. Panel C reports regression results for OECD versus non-OECD countries. Standard errors (shown in parentheses) allow for heteroskedasticity. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| Panel A: Full Sample | | | | |
|---|------------------------|-----------------------|--------------|-----------|
| | STR | Constant | Observations | R-squared |
| Full Sample | -0.8310*** (0.1356) | 0.6689*** (0.0340) | 100 | 0.2534 |
| Full Sample (STR > 15%) | -0.5513** (0.2215) | 0.5897*** (0.0599) | 86 | 0.0592 |
| Panel B: EU vs. Non-EU Countries | | | | |
| | STR | Constant | Observations | R-squared |
| EU | 0.2616 (0.3401) | 0.4768*** (0.0881) | 28 | 0.0285 |
| EU (STR > 15%) | 0.6691** (0.3149) | 0.3612*** (0.0775) | 25 | 0.1425 |
| Non-EU | -1.0367*** (0.1285) | 0.6914*** (0.0341) | 72 | 0.4320 |
| Non-EU (STR > 15%) | -0.8306*** (0.2573) | 0.6333*** (0.0751) | 61 | 0.1446 |
| Panel C: OECD vs. Non-OECD Countries | | | | |
| | STR | Constant | Observations | R-squared |
| OECD | -0.6614** (0.3043) | 0.6643*** (0.0831) | 30 | 0.0871 |
| OECD (STR > 15%) | -0.5287 (0.3491) | 0.6238*** (0.0971) | 29 | 0.0478 |
| Non-OECD | -0.9364*** (0.1531) | 0.6753*** (0.0366) | 70 | 0.3559 |
| Non-OECD (STR > 15%) | -0.6137** (0.2908) | 0.5861*** (0.0778) | 57 | 0.0820 |

Figure 3-4 includes only EU countries. It can be seen that the association between the *Tax Attractiveness Index* and the statutory tax rate is very weak (solid line). However, if countries with a statutory tax rate of less than 15% are neglected, even a positive correlation can be observed (dashed line).

Figure 3-4: Tax Attractiveness Index and Statutory Tax Rate – EU Countries

Figure 3-4 shows the relation between the *Tax Attractiveness Index* and the statutory tax rate. For the purpose of this analysis, we exclude the statutory tax rate from the index. Thus, the *Tax Attractiveness Index* is defined as an equally-weighted sum of 15 different tax factors determining a country's tax attractiveness. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. This figure includes only sample countries that are member of the EU, defined as those who belong to the EU in the year 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Mean values of the statutory tax rate over years 2005 to 2009 are entered on the abscissa. On the ordinate, mean values of the *Tax Attractiveness Index* for this period are plotted. The solid line is a linear fit to all EU countries. The dashed line is a linear fit to EU countries with mean statutory tax rates of more than 15%.



Panel B of Table 3-6 reports corresponding regression results. If all EU countries are taken into consideration, the coefficient for the statutory tax rate is insignificant. If low tax EU countries are excluded, remarkably, the statutory tax rate has a significantly positive coefficient. Results suggest that the statutory tax rate is not a suitable proxy for a country's tax environment. There are EU countries offering extremely favorable tax environments as reflected by high index values although they impose high statutory tax rates. Panel B of Table 3-6 also reports results for non-EU countries. The statutory tax rate and the *Tax Attractiveness Index* are significantly negatively correlated. In Panel C of Table 3-6, we distinguish between OECD and non-OECD countries. Again, in case all OECD countries are considered, the coefficient for the statutory tax rate is significantly negative. Though, the level of significance is not as high as for the full sample. If, however, the number of observation is reduced to OECD countries with tax rates of more than 15%, the coefficient is insignificant. For non-OECD countries, the relation between the *Tax Attractiveness Index* and the statutory tax rate is significantly negative. Though, if low tax countries are neglected, the level of significance decreases.²⁶

Our analysis reveals that the *Tax Attractiveness Index* and the statutory tax rate are negatively correlated with each other. However, the statutory tax rate is not a suitable proxy for the *Tax Attractiveness Index* in any case. Especially in Europe, there are countries simultaneously imposing high statutory tax rate and achieving high index values. Hence, jurisdictions perceived as high tax countries may offer an attractive tax environment. From this, we can conclude that countries set incentives other than the tax rate, such as a broad treaty network, group taxation regimes, and special holding

²⁶ Regression outputs from including all observations separately and not using mean values per country are presented in Table B.III in the appendix. Results do not differ significantly.

regimes to attract multinational enterprises. Our findings suggest that the characteristics of other tax factors cannot be predicted on the basis of the statutory tax rate.

3.4.2 Tax Attractiveness Index and Effective Tax Rates

For further analyses, we relate the *Tax Attractiveness Index* to effective tax rates computed according to the methodology developed by King and Fullerton (1984) and extended by Devereux and Griffith (1999, 2003). Data for the effective marginal as well as the effective average tax rate for 19 countries up to the year 2005 are provided by the Institute for Fiscal Studies (see Devereux et al. 2002).²⁷ Figure 3-5 displays the relation between the effective marginal tax rate and the *Tax Attractiveness Index* in year 2005.²⁸ As expected, the index is negatively correlated with the effective marginal tax rate (the higher the effective marginal tax rate, the lower the *Tax Attractiveness Index*). However, the correlation is not significant.²⁹

²⁷ Buettner and Ruf (2007) use these data for their analyses.

²⁸ We use data referring to the base case. The following assumptions apply: investment in plant and machinery, financed by equity or retained earnings, taxation at shareholder level not included, real discount rate: 10%, inflation rate: 3.5%, depreciation rate: 12.25% (see <http://www.ifs.org.uk/publications/3210>).

²⁹ Due to the fact that only 19 observations are available, we refrain from reporting results from regression analysis separately. Instead, straight line equations are integrated into Figures 3-5 and 3-6.

Figure 3-5: Tax Attractiveness Index and Effective Marginal Tax Rate 2005

This figure displays the relation between the *Tax Attractiveness Index* and the effective marginal tax rate. Effective marginal tax rates for 19 countries up to the year 2005 are provided by the Institute for Fiscal Studies. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. This figure displays all 19 countries for which the effective marginal tax rates are available in 2005. The effective marginal tax rate for the year 2005 is entered on the abscissa. On the ordinate, the *Tax Attractiveness Index* for the year 2005 is plotted. The solid line is a linear fit to the 19 sample countries.

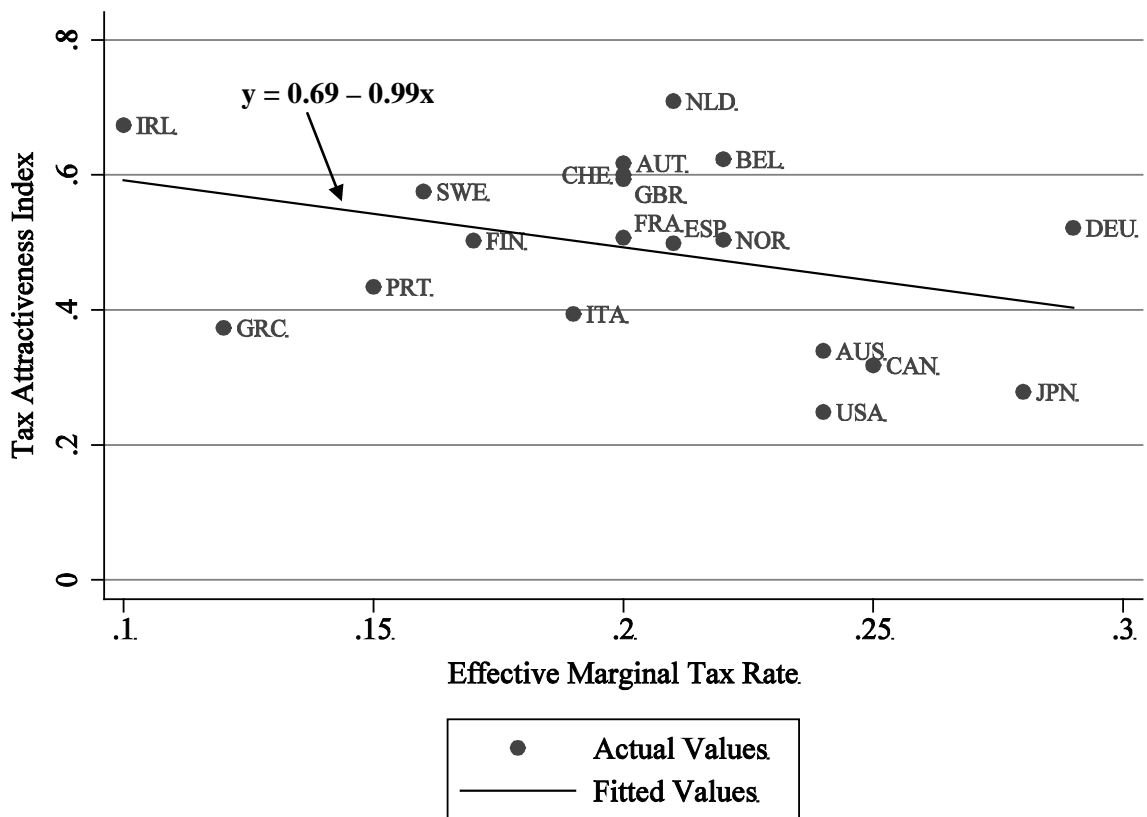
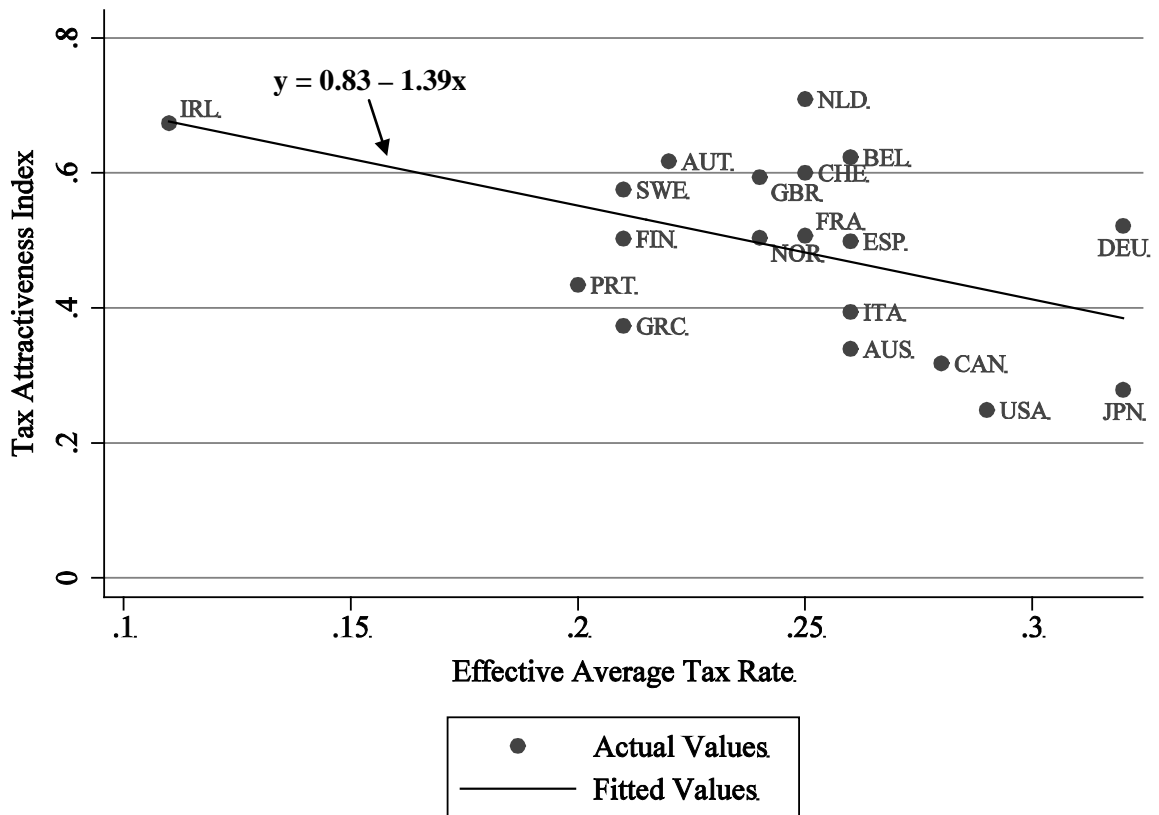


Figure 3-6 shows the relation between the effective average tax rate and the *Tax Attractiveness Index* for the year 2005.³⁰ Both tax measures are significantly negatively correlated. However, the relationship is not perfect since there are countries having high effective tax rates while achieving high index values. The Netherlands as well as Belgium and Switzerland serve as an example.

³⁰ Consistent with the analysis of the effective marginal tax rate, we use data referring to the base case. The following assumptions apply: investment in plant and machinery, financed by equity or retained earnings, taxation at shareholder level not included, rate of economic rent: 10% (i.e. financial return: 20%), real discount rate: 10%, inflation rate: 3.5%, depreciation rate: 12.25% (see <http://www.ifs.org.uk/publications/3210>).

Figure 3-6: Tax Attractiveness Index and Effective Average Tax Rate 2005

This figure displays the relation between the *Tax Attractiveness Index* and the effective average tax rate. Effective average tax rates for 19 countries up to the year 2005 are provided by the Institute for Fiscal Studies. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. This figure displays all 19 countries for which the effective average tax rate is available in 2005. The effective average tax rate for the year 2005 is entered on the abscissa. On the ordinate, the *Tax Attractiveness Index* for the year 2005 is plotted. The solid line is a linear fit to the 19 sample countries.



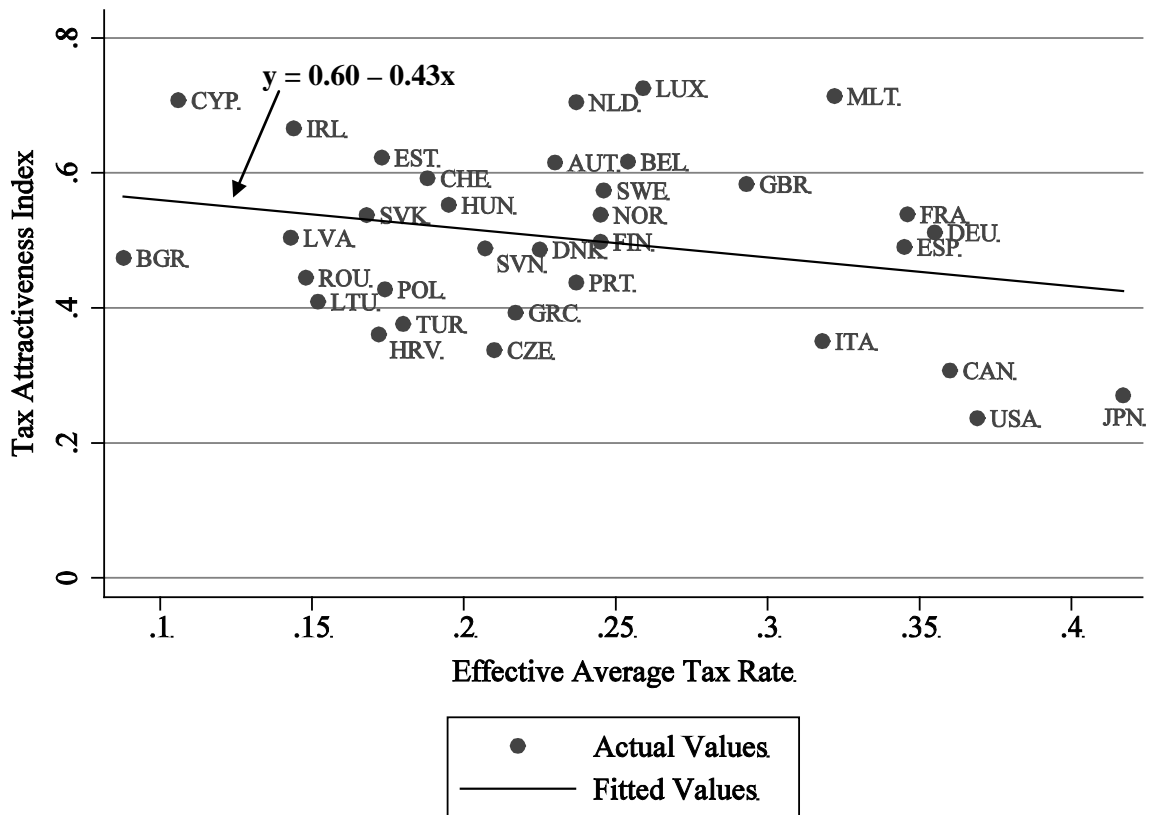
Effective average tax rates for 27 EU countries as well as 7 other countries (Croatia, Norway, Switzerland, Turkey, Canada, Japan, and the United States) for the years 1998 to 2007 are published by Devereux et al. (2008) in their report for the European Union (see also Elschner and Vanborren 2009).³¹ We use effective average tax rates per country for the year 2007 for comparison with the *Tax Attractiveness Index*. We refer to the case only considering corporation taxes.³² Figure 3-7 depicts the relation between the effective average tax rate and the *Tax Attractiveness Index* for the year 2007. The slope of the line representing fitted values is rather low indicating the correlation is weak. Again, countries, such as Malta, Luxembourg, and the Netherlands offer favorable tax conditions as reflected by high index values although their effective tax rates are rather high.

³¹ Hebous et al. (2011) rely on these effective tax rates for the purpose of their empirical analysis.

³² Devereux et al. (2008) compute various effective tax rates depending on the asset that is invested in and the source of finance. We use the overall mean values provided.

Figure 3-7: Tax Attractiveness Index and Effective Average Tax Rate 2007

This figure displays the relation between the *Tax Attractiveness Index* and the effective average tax rate. Effective average tax rates for 34 countries up to the year 2007 are provided by Devereux et al. (2008). The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. This figure displays all 34 countries for which the effective average tax rate is available in 2007. The effective average tax rate for the year 2007 is entered on the abscissa. On the ordinate, the *Tax Attractiveness Index* for the year 2007 is plotted. The solid line is a linear fit to the 34 sample countries.



Our analysis shows neither the effective marginal nor the effective average tax rate is a perfect proxy for the *Tax Attractiveness Index*. Thus, the index cannot be represented by existing tax measures. In contrast, it includes tax factors that have not been integrated so far. Thus, the index constitutes a new, innovative approach to measuring a country's tax conditions which may be useful in future empirical studies.

3.5 Conclusion

This study analyzes and evaluates the freshly developed *Tax Attractiveness Index*. We observe regional clusters in the *Tax Attractiveness Index* and certain tax rules. Moreover, in order to validate the index we show that it corresponds with the OECD lists of countries and tax regimes perceived as constituting harmful tax competition. However, several exceptions can be noticed revealing that certain countries were removed from the OECD list although their tax environments have not changed significantly or have even improved. Furthermore, we find that the statutory tax rate is not a suitable proxy for a country's tax environment in any case. In contrast, countries set incentives other than the statutory tax rate to attract firms and investments. Especially in Europe, many high tax countries offer extremely favorable tax conditions. Finally, we show that effective tax rates used in several previous publications are not perfectly correlated with the *Tax Attractiveness Index*, either. Therefore, the index represents a genuinely innovative approach to measuring tax climates across countries.

The *Tax Attractiveness Index* can be employed by international researchers as a new tax measure in future studies. Since existing tax measures cover only a limited number of tax factors, the application of the *Tax Attractiveness Index* might yield further insights into the influence of taxation on the location, investment, and financing

decisions of multinational companies. With respect to the current discussion about harmful tax competition (see OECD 2013), governments and international committees working on tax harmonization get an insight about countries offering extremely favorable tax conditions.

4 Tax Attractiveness and the Location of German-Controlled Subsidiaries³³

4.1 Introduction

In the course of globalization and ongoing economic integration, a growing number of companies have developed international activities. The reasons why firms establish subsidiaries in foreign countries are diverse. First, the size of the host market, lower factor prices, distance from the parent country, and market-access motives may drive them to locate production abroad.³⁴ Second, recent literature reveals that taxation also has an influence on location decisions for production (see Devereux and Griffith 1998; Buettner and Ruf 2007). Moreover, there is evidence that multinational enterprises establish subsidiaries in off-shore tax havens (see, e.g., Desai et al. 2006a) and furthermore set up intermediate group entities, such as holding or financial companies, for tax purposes only. In this way, complicated group structures may arise, successfully aiming at reducing the tax burden (see, e.g., Collins 2011; Drucker 2010; Mintz and Weichenrieder 2010). However, empirical evidence in this field is scarce. Therefore, we ask the question as to how taxation affects the location decisions of multinational enterprises. Specifically, this paper analyzes whether companies place subsidiaries in countries that offer an attractive tax environment.

As a measure of a country's tax conditions, we are the first to use the *Tax Attractiveness Index* (see Keller and Schanz 2013a). Most existing studies either apply

³³ This chapter is based on Keller, S. and Schanz, D. (2013), "Tax attractiveness and the location of German-controlled subsidiaries", arqus-Working Paper No. 142, available from: www.arqus.info.

³⁴ Economic theory distinguishes between two main driving forces for becoming a multinational firm. According to the vertical model, differences in factor prices across countries lead to the emergence of multinational companies (see Helpman 1984, 1985). According to the horizontal model, the internationalization decision is motivated by market access (see Markusen 1984, 2002).

the statutory tax rate or a model-based effective tax rate to explain the influence of taxation on corporate decisions. It is well-known that, in most cases, the statutory tax rate is an unsatisfactory proxy for the tax environment due to the fact that it neglects tax base effects. To overcome this shortcoming at least partially, previous studies apply effective tax rates that capture tax base determinants, such as depreciation allowances and interest deductions. However, existing measures focus on very few tax rules that are important for the location and volume of real investments. Many other important real-world domestic and cross-border tax rules, such as group taxation regimes, thin capitalization rules or double tax treaty networks have not been integrated yet. We argue that the location decisions of multinational enterprises depend on a bundle of tax factors. Hence, the *Tax Attractiveness Index* that we employ for this study covers 18 tax factors, such as the taxation of dividends and capital gains, withholding taxes, the existence of a group taxation regime, the double tax treaty network, and thin capitalization rules (see Keller and Schanz 2013a)³⁵. In this way, it also reflects a country's tax planning opportunities that multinational enterprises may take advantage of by establishing intermediate group units, such as holding companies there.

To investigate the location decisions of multinational firms, we focus on the number of subsidiaries that German parent companies operate in different host countries. To be precise, on the basis of count data regression models, we analyze whether the tax environment, as measured by the *Tax Attractiveness Index*, has an influence on location decisions and, hence, the number of subsidiaries. Our empirical

³⁵ In its original version, the *Tax Attractiveness Index* contains a dummy variable indicating whether the respective country is part of the European Union and, therefore, benefits from the EU directives (see Keller and Schanz 2013a). However, in this study, we replace the dummy variable with the specific withholding tax rates to Germany, making our analysis more precise for our Germany-related research question. Data for both versions of the *Tax Attractiveness Index* are available upon request.

analysis is based on a novel data set consisting of the subsidiaries³⁶ of German DAX30 companies³⁷ over years 2005 to 2009. We consider Germany to be a suitable reference country since dividends from foreign affiliates are exempt from taxation.³⁸ Therefore, parent country taxation can be neglected and, hence, the corporate tax environment of the host country which is subject to our study is critical. To ensure a comprehensive picture of German-controlled affiliates abroad, we do not rely on existing databases, but we hand-collect our data. Our final sample includes subsidiaries of German DAX30 parent companies that are located in 97 different host countries – including tax havens – spread across the world.

The main finding of our study is that a host country's tax environment, as measured by the *Tax Attractiveness Index*, plays a significant role in determining the number of German-controlled subsidiaries located there. Controlling for non-tax influences, our analysis reveals that the *Tax Attractiveness Index* has a positive impact on the number of subsidiaries. Since the effect we find is substantial, we can conclude that taxation has an influence on the location decisions of multinational enterprises. Our results imply that the location choices depend on multiple tax factors as combined in the *Tax Attractiveness Index*. Multinational companies establish (an increased number of) affiliates in tax attractive countries, suggesting that they implement tax-efficient corporate group structures by making use of intermediate companies in favorable holding locations and by placing subsidiaries in off-shore tax havens. We perform several robustness checks to ensure the reliability of our results. Furthermore, we show

³⁶ We include all legally independent entities held by a parent company. We use the terms *subsidiary* and *affiliate* interchangeably.

³⁷ DAX30 is the major German stock market index (*Deutscher Aktien Index*) and comprises the 30 largest listed companies based on order book volume and market capitalization.

³⁸ According to Section 8b of the German corporate income tax code (*Körperschaftsteuergesetz*), dividends distributed by national or foreign affiliates can be received free of tax. Only 5% of dividends are taxed as non-deductible operating expenditures.

that the location decisions of multinational enterprises cannot be explained by the statutory tax rate alone. Although the corporate tax rate has a significant effect on the number of subsidiaries in a country, location decisions can be better explained by a bundle of tax factors as combined in the *Tax Attractiveness Index*. Decomposing the *Tax Attractiveness Index*, we identify the withholding taxes that a country imposes as well as its double tax treaty network and the existence of a special holding regime as key tax drivers for foreign subsidiary location decisions.

Our research is relevant for different groups of addressees: first, it is important for policy makers. The *Tax Attractiveness Index* makes it possible to rank countries according to their tax environment, and our analysis reveals which countries succeed in attracting foreign subsidiaries. From this, governments and politicians can compare their current tax position to other countries and learn about firm location positions. In addition, our study provides insight into the tax factors that multinational enterprises consider to be the most important in their location decisions. Policy makers might use this knowledge in regard to future tax reforms that may be targeted to enhance location attractiveness. Furthermore, for German policy makers, it is valuable to be aware of the location of German-controlled subsidiaries. Since Germany is a high tax country, tax authorities could potentially lose tax revenue and the economy might even lose jobs.³⁹ The issue of international tax base erosion caused by profit-shifting has been recently addressed by the OECD (2013).

Second, our findings are relevant for companies as well as consultants. This group could gain insight into the location strategies of other multinational enterprises.

³⁹ However, recent articles reveal that internationalization is not necessarily associated with less tax revenue in high tax countries. The possibility of shifting profits into low tax countries might even have a positive effect on the investment level in high tax countries, such as Germany and the U.S. (see Becker and Fuest 2010; Overesch 2009; Desai et al. 2006b).

Furthermore, from the *Tax Attractiveness Index* which we provide per country, they can identify favorable tax jurisdictions that might be used for future tax planning purposes. Third, researchers can benefit from our analysis. We reveal that the foreign subsidiary location decisions depend on a bundle of tax factors, most of which have never been previously included in empirical research. This might drive international researchers to employ the *Tax Attractiveness Index* as a tax measure in future studies. Moreover, we provide an idea of which tax factors matter most for the location decisions of multinational firms. This knowledge could be valuable for forthcoming research.

All mentioned groups of addressees might be interested in our comparison of the statutory tax rate's influence on location decisions with the *Tax Attractiveness Index*' influence on location choices. In the past, many studies and also the public media (see, e.g., Rapoza 2011; Isidore 2012) have focused mainly on the corporate tax rate when comparing different countries' taxes. Although there is no doubt that the corporate tax rate has an important signaling function (see, e.g., OECD 2001), we show that multinationals take additional tax factors into account in their location decisions. Therefore, relying only on statutory tax rates will not be sufficient in the future, e.g., for politicians regarding their own tax system as well as those of competing countries or for consultants and investors. Accordingly, the importance of taking the entire tax system, including double taxation conventions, into account, instead of only tax rates, has recently been emphasized by the OECD (2013).

The remainder of the paper is organized as follows: in the next section, we relate our topic to existing literature providing the theoretical background for our analysis, and we develop our hypothesis. In section 3, we present the *Tax Attractiveness Index*, our firm data set and the econometric methodology that we apply. Section 4 is dedicated to

the results of our empirical analysis. In section 5, we subject our results to multiple robustness checks, we replace the *Tax Attractiveness Index* with the statutory tax rate and we decompose the index to learn about the key drivers of our results. In the last section, we reveal the limitations of our study and we draw conclusions.

4.2 Theoretical Background and Hypothesis

Existing studies dealing with the influence of taxation on the location decisions of multinational enterprises form part of a sizeable body of empirical research that investigates the impact of taxation on foreign direct investment (FDI). This literature confirms a significantly negative effect of the host country's tax level on the volume and frequency of FDI.⁴⁰

In contrast to our study, tax measures used in prior literature take only very few tax rules into consideration when analyzing the effect of taxation on location decisions. Most studies use either the statutory tax rate or they apply model-based effective tax rates which only include information about the depreciation of assets, financing activities, and the statutory corporate tax rate. The underlying methodology developed by King and Fullerton (1984) and put forward by Devereux and Griffith (1999, 2003) is to determine the effective tax burden of a hypothetical standardized investment project. The basic approach refers to the influence of taxation on an investment that only earns the cost of capital (effective *marginal* tax rate) (see, e.g., Devereux et al. 2002).

⁴⁰ Hines (1997, 1999) and Devereux (2007) provide comprehensive reviews of the existing literature. Based on previous studies, De Mooij and Ederveen (2003, 2006) and Feld and Heckemeyer (2011) conduct meta-analyses. Early contributions in the field of taxation and FDI are based on aggregate FDI flows (see Hartman 1984, for pioneering work). Other analyses use aggregated firm-level data on property, plant, and equipment to investigate real economic activity more accurately than FDI in its broad definition (see Grubert and Mutti 1991, 2000; Hines and Rice 1994; Altshuler et al. 2001). However, due to the underlying data structure, they are not capable of disentangling the discrete location choice and the subsequent continuous choice of the investment level. With the availability of firm-level data, the number of studies examining international location decisions has increased (see the framework developed by Devereux 2007).

However, prior studies claim that location decisions depend on the effective *average* tax rate, rather than on the effective *marginal* tax rate (see Devereux and Griffith 1998). The effective *average* tax rate represents the impact of taxes, assuming a higher profitability of the underlying investment project.⁴¹

Based on the statutory tax rate or the effective tax rate as a proxy for the tax environment of a country, one strand of literature applies logit estimation models to analyze tax effects on location decisions. Devereux and Griffith (1998) analyze how taxation influences the decisions of U.S. multinational enterprises whether to place a subsidiary in the UK, France, or Germany (conditional on having chosen to produce in Europe) over the years 1980 to 1994. As expected, they identify the host country's effective average tax rate (but not the effective marginal tax rate) to be important for the location decision. Similar to this approach, Buettner and Ruf (2007) examine the impact of taxation on German outbound FDI in 18 different host countries between 1996 and 2003. Their results indicate that the statutory tax rate has considerably more predictive power for the location decision than the effective marginal tax rate; Hebous et al. (2011) find a similar result when analyzing differences in tax sensitivity between M&A and Greenfield investments. Consistent with Devereux and Griffith (1998), Buettner and Ruf (2007) find no effect of the effective marginal tax rate. Barrios et al. (2012) are the first to integrate parent country taxation into the location choice of European multinational firms over the period 1999-2003.⁴² Making use of a conditional logit model, their findings suggest that the corporate taxation of both the host country and the parent country exerts a negative influence.

⁴¹ Devereux and Griffith (2003) argue that, for the discrete location choice, the effect of taxation on the after-tax profit of the total investment project is decisive.

⁴² Parent country taxation occurs in case of countries that tax the income of multinational enterprises on a worldwide basis (in contrast to Germany, where foreign dividends are exempt from taxation).

As an alternative method for modeling discrete foreign subsidiary location decisions, studies applying count data estimation have recently emerged (see Becker et al. 2012; Overesch and Wamser 2009, 2010; Stöwhase 2002).⁴³ In contrast to binary choice models (logit), count data models are able to take the fact that multinational enterprises mostly operate more than one subsidiary in one host country into consideration. Hence, a count variable contains more information than a binary variable. Although the regression technique in recent literature has changed from logit models to count data models, the tax measures applied to explain foreign subsidiary location decisions remain the same: either the statutory tax rate or model-based effective tax rates are employed. Based on the number of German outbound FDI positions in 30 European countries over the years 1989 to 2005, Overesch and Wamser (2009) show that the host country's effective average tax rate has a negative influence on the location decision. Furthermore, they aim at investigating asymmetries in tax elasticity depending on different FDI characteristics. Dividing FDI according to the type of business activity, their analysis reveals that financial services and R&D activities are most tax sensitive. In line with other studies, Overesch and Wamser (2009) put forward the argument that the statutory tax rate is decisive for the location choice of non-manufacturing group units, such as holdings and financing companies (see Stöwhase 2002; Overesch and Wamser 2010). Remarkably, they do not find a significant effect in the case of holding companies.⁴⁴ Overesch and Wamser (2010) find a negative impact of the effective

⁴³ On a national level, previously, Papke (1991) has used count data estimation to investigate the influence of tax rate differentials between U.S. states on the number of firm births in the manufacturing sector.

⁴⁴ The authors identify holding companies according to industry code. In a similar approach, Stöwhase (2002) suggests that the effective average tax rate is a significant determinant of real investment. In the case of service, finance and R&D activities, he finds an influence of the statutory tax rate.

average and the statutory tax rate on the location decisions of German companies in ten eastern European countries.

A different type of effective tax rates is analyzed by Markle and Shackelford (2012). They empirically investigate *accounting* effective tax rates based on financial statement information. Their analysis reveals that the location of the parent company strongly affects a multinational's worldwide effective tax burden, while the locations of its subsidiaries have much less impact. Moreover, the authors show that mean values of the financial statement-based effective tax rates per country are highly correlated with the statutory tax rates of the parents' home countries. Dyreng and Lindsey (2009) also investigate effective tax rates based on financial accounting data. Their findings indicate that U.S. firms with subsidiaries in tax havens face a lower worldwide tax liability than those who do not operate in tax havens. Overall, the *accounting* effective tax rate approach is interesting for analyzing the *ex post* tax burdens of multinationals depending on their locations; however, this approach is not suitable for an *ex ante* analysis of the influence of a country's tax environment.

Next to statutory tax rates and tax base determinants, such as depreciation, included in model-based effective tax rates, few other tax factors have been analyzed so far. Mintz and Weichenrieder (2010) are the first to investigate indirect group structures empirically. Exploiting data on German outbound FDI, they reveal that multinational enterprises set up holdings in a third country in order to gain access to favorable tax rules agreed on in a double tax treaty (so called *treaty shopping*), such as reduced withholding taxes. Moreover, they find that intermediate entities may be used to implement tax-efficient financing structures.⁴⁵ In addition, it is shown that the existence

⁴⁵ Mintz (2004) develops a corresponding model.

of a group taxation regime increases the probability of setting up a country holding.⁴⁶ Further tax planning strategies involving holding companies can be found, e.g., in Eicke (2009).

Apparently, existing tax measures focus only on few tax factors. Contributing to existing literature, we apply the *Tax Attractiveness Index*, which does not only include tax factors that determine the location decisions of real investment, but also captures those that may explain the cross-border location decisions of non-operative group units, such as holdings or similar tax planning entities.

Mintz and Weichenrieder (2010) descriptively identify the Netherlands, Switzerland, Luxembourg, and Ireland as favorable holding locations. This evaluation is confirmed by Desai et al. (2003) who analyze the influence of indirect structures on FDI of U.S. multinational enterprises. Typical off-shore tax havens, such as Bermuda, the Bahamas, and the Cayman Islands seem not to play a significant role in hosting intermediate companies because they lack a comprehensive treaty network (see Mintz and Weichenrieder 2010). Still, very low statutory tax rates that apply in tax havens represent incentives to place subsidiaries there (e.g., as profit-shifting entities). We aim at analyzing the importance of tax havens for the location of foreign affiliates. The activities of U.S. multinational enterprises in tax havens have been widely studied (see Hines and Rice 1994; Grubert and Slemrod 1998; Hines 2005; Desai et al. 2006a). However, evidence for the operations of German multinational firms in tax havens is

⁴⁶ Oestreicher and Koch (2010) empirically analyze the determinants of forming a German tax group. They reveal that the introduction of the exemption method for corporate shareholders in 2001 leads to an increase in the probability of establishing a tax group.

scarce.⁴⁷ Therefore, this paper seeks to examine the role that tax havens play in the location decisions of German multinational enterprises.

We put forward the theory that the location decisions of multinational enterprises can be explained by the *Tax Attractiveness Index*. Hence, we examine the following hypothesis:

The host country's tax environment as measured by the Tax Attractiveness Index has a positive influence on the location decisions of German multinational enterprises.

We operationalize the location decisions by counting the number of subsidiaries a German DAX30-parent company holds in a distinct host country.

4.3 Data Description and Empirical Methodology

4.3.1 Tax Attractiveness Index

As a tax measure that is relevant for the location decisions of multinational enterprises, we apply the *Tax Attractiveness Index* (see Keller and Schanz 2013a).⁴⁸ This index intends to provide a detailed picture of a country's tax environment. It especially aims at reflecting the tax planning opportunities offered by a particular location. Therefore, in contrast to existing tax measures, the *Tax Attractiveness Index* also captures the tax factors that may drive multinational enterprises to establish intermediate affiliates, such as holding companies.

The *Tax Attractiveness Index* covers 18 different tax factors, including the statutory tax rate, the taxation of dividends and capital gains, withholding taxes, loss

⁴⁷ Gumpert et al. (2011) are a recent exemption. They investigate variation in tax haven use between different industries for a sample of German multinational companies.

⁴⁸ In other contexts, the application of indices is widely accepted. A famous example is the creditor rights index introduced by La Porta et al. (1998) that has been applied in many subsequent articles (see, e.g., Djankov et al. 2007; Spamann 2010). In the sense of Hung (2000), Jacob and Goncharov (2012) construct a tax accrual index that counts accrual norms codified in tax law.

offset provisions, the group taxation regime, the double tax treaty network, thin capitalization rules, controlled foreign corporation (CFC) rules, anti-avoidance legislation, the personal statutory income tax rate and the existence of a special holding regime. Most of the tax factors are qualitative in nature, but have been quantified in order to be summarized in one index value per country. All tax factors are restricted to values between zero and one. In each case, a value of one indicates the optimum (e.g., a statutory tax rate of 0%; the possibility of cross border group relief; no thin capitalization rules) while a value of zero signifies least favorable tax conditions (e.g., the highest statutory tax rate in the sample; no group relief; the existence of thin capitalization rules). Adding values for all single tax factors and dividing the sum by 18 yields the country-specific *Tax Attractiveness Index*. Consistent with the single tax factors, the index varies between zero and one with high values indicating an attractive tax environment. The index is constructed for 41 European countries, 18 countries that are situated in Africa and the Middle East, 19 in North and South America, 16 in Asia-Pacific, and 6 in the Caribbean; it is measured on an annual basis.

As a first element, the index includes the statutory tax rate since it determines the general level of taxation faced by corporate entities. The statutory tax rate is defined as the corporate income tax rate plus surcharges and local trade taxes. For the purpose of standardization, it is put into relation to the highest statutory tax rate of the 100 sample countries. Thus, a value of one stands for a zero tax rate, while a value of zero is reached in the case of the highest tax rate in the sample. Furthermore, taxation of dividends and capital gains is taken into account. In many countries, a participation exemption applies which allows that dividends from affiliated companies as well as capital gains can be received free of tax. This is an attractive feature that companies

might take into consideration when making their location decision. The *Tax Attractiveness Index* accounts for the extent to which dividends and capital gains are tax exempt. Next, withholding taxes that a country levies are measured, since it is very much in the interest of multinational companies that withholding taxes be abolished as they cause double taxation. Therefore, the EU Parent-Subsidiary Directive and the Interest and Royalties Directive are in effect eliminating withholding taxes within the European Union. Moreover, in most double tax conventions, the minimization of withholding taxes is codified. To provide a detailed picture, the *Tax Attractiveness Index* includes six different withholding taxes. On the one hand, it covers withholding taxes on dividends, interest and royalties that are constituted in domestic law. On the other hand, it considers withholding taxes on dividends, interest and royalties that each host country levies in its relationship with Germany. In this way, the index accounts for the possibility that either an EU provision or a double tax treaty applies that abolish or lower withholding taxes.

In addition, the *Tax Attractiveness Index* considers the loss offset provisions that a country offers by including measures for loss carry back as well as loss carry forward opportunities. As a further tax factor, the index includes the possibility of filing a consolidated group return. Under a group relief, profits from one subsidiary can be used to compensate for losses incurred by another group member. Thereby, the overall group tax burden is lowered. Next, the index includes the number of double tax treaties that a country has concluded. A comprehensive treaty network may represent an important determinant of the location decision. By setting up a subsidiary in such countries, companies obtain access to favorable tax rules agreed upon in a double tax convention that they could not have otherwise exploited. Furthermore, the index incorporates thin

capitalization rules, CFC rules, and a country's general anti-avoidance legislation to account for measures that countries put into force in order to secure tax revenue. From the multinational firms' perspective, the existence of such provisions is not desirable as they hinder them from allocating their profits in the most efficient way. Additionally, the *Tax Attractiveness Index* incorporates the personal income tax rate to allow for the level of taxation faced by the employees of a subsidiary. As a last criterion, the index considers whether a jurisdiction offers a special holding regime which decreases the corporate tax burden below the standard level by, for example, offering lower corporate tax rates for holding companies. Table 4-1 reports mean values of the *Tax Attractiveness Index* for 100 countries over the 2005 to 2009 period.

Table 4-1: Tax Attractiveness Index per Country

This table reports mean values of the *Tax Attractiveness Index (TAX)* per sample country over years 2005 to 2009. *TAX* represents an equally-weighted sum of 18 tax factors. It is restricted to values between zero and one. The closer the *TAX* is to one, the more attractive is the tax environment that country *i* offers.

| Country (Code) | TAX | Country (Code) | TAX | Country (Code) | TAX | Country (Code) | TAX |
|---------------------------|--------|---------------------|--------|----------------------|--------|------------------------|--------|
| Algeria (DZA) | 0.3946 | Denmark (DNK) | 0.5409 | Korea (South) (KOR) | 0.2601 | Poland (POL) | 0.4583 |
| Angola (AGO) | 0.4146 | Dom. Republic (DOM) | 0.4120 | Latvia (LVA) | 0.5421 | Portugal (PRT) | 0.4694 |
| Argentina (ARG) | 0.1758 | Ecuador (ECU) | 0.4684 | Lebanon (LBN) | 0.5355 | Puerto Rico (PRI) | 0.3476 |
| Australia (AUS) | 0.4108 | Egypt (EGY) | 0.3747 | Liechtenstein (LIE) | 0.6241 | Romania (ROU) | 0.4823 |
| Austria (AUT) | 0.6603 | El Salvador (SLV) | 0.5215 | Lithuania (LTU) | 0.4433 | Russia (RUS) | 0.4752 |
| Bahamas (BHS) | 0.8889 | Estonia (EST) | 0.6558 | Luxembourg (LUX) | 0.7528 | Saudi Arabia (SAU) | 0.5334 |
| Bahrain (BHR) | 0.8381 | Finland (FIN) | 0.5562 | Macedonia (MKD) | 0.5545 | Serbia (SRB) | 0.4532 |
| Bangladesh (BGD) | 0.4364 | France (FRA) | 0.5840 | Malaysia (MYS) | 0.7404 | Singapore (SGP) | 0.7497 |
| Belarus (BLR) | 0.4698 | Germany (DEU) | 0.4928 | Malta (MLT) | 0.7012 | Slovak Republic (SVK) | 0.5928 |
| Belgium (BEL) | 0.6627 | Great Britain (GBR) | 0.6367 | Mauritius (MUS) | 0.6090 | Slovenia (SVN) | 0.5193 |
| Bermuda (BMU) | 0.8889 | Greece (GRC) | 0.4399 | Mexico (MEX) | 0.3936 | South Africa (ZAF) | 0.5717 |
| Bolivia (BOL) | 0.5650 | Guatemala (GTM) | 0.5256 | Montenegro (MNE) | 0.5612 | Spain (ESP) | 0.5451 |
| Botswana (BWA) | 0.4190 | Guernsey (GGY) | 0.6405 | Morocco (MAR) | 0.5134 | Sweden (SWE) | 0.6219 |
| Brazil (BRA) | 0.4052 | Hong Kong (HKG) | 0.6137 | Namibia (NAM) | 0.5823 | Switzerland (CHE) | 0.6428 |
| Brit. Virg. Islands (VGB) | 0.8504 | Hungary (HUN) | 0.5759 | Netherlands (NLD) | 0.7400 | Taiwan (TWN) | 0.3461 |
| Bulgaria (BGR) | 0.5031 | Iceland (ISL) | 0.6147 | Neth. Antilles (ANT) | 0.7354 | Thailand (THA) | 0.4424 |
| Canada (CAN) | 0.4077 | India (IND) | 0.4797 | New Zealand (NZL) | 0.3718 | Tunisia (TUN) | 0.4779 |
| Cayman Islands (CYM) | 0.8611 | Indonesia (IDN) | 0.3161 | Nicaragua (NIC) | 0.5217 | Turkey (TUR) | 0.4633 |
| Chile (CHL) | 0.3055 | Ireland (IRL) | 0.7061 | Nigeria (NGA) | 0.5087 | Ukraine (UKR) | 0.5398 |
| China (CHN) | 0.4042 | Israel (ISR) | 0.3784 | Norway (NOR) | 0.6605 | Unit. Arab Emir. (ARE) | 0.8495 |
| Colombia (COL) | 0.3253 | Italy (ITA) | 0.4405 | Pakistan (PAK) | 0.4015 | United States (USA) | 0.3781 |
| Costa Rica (CRI) | 0.4703 | Japan (JPN) | 0.3643 | Panama (PAN) | 0.5301 | Uruguay (URY) | 0.6137 |
| Croatia (HRV) | 0.4841 | Jersey (JEY) | 0.8050 | Paraguay (PRY) | 0.5623 | Venezuela (VEN) | 0.2590 |
| Cyprus (CYP) | 0.7409 | Kazakhstan (KAZ) | 0.4420 | Peru (PER) | 0.2392 | Vietnam (VNM) | 0.4956 |
| Czech Republic (CZE) | 0.4443 | Kenya (KEN) | 0.4991 | Philippines (PHL) | 0.2990 | Zimbabwe (ZWE) | 0.3617 |

4.3.2 Firm Data

Our empirical analysis is based on a hand-collected data set consisting of the subsidiaries of German DAX30 companies. We consider the DAX30 enterprises to be most suitable for our purposes since they operate great numbers of subsidiaries in diverse countries all over the world. For several reasons, we refrain from using existing databases. First, the AMADEUS database provided by Bureau van Dijk that has been used in several previous publications (see, e.g., Barrios et al. 2012) offers financial data for exclusively European affiliates. Nevertheless, the names and the respective locations of non-European subsidiaries are listed, which would yield sufficient information for our main analysis. However, a crosscheck reveals that the database rarely includes *all* subsidiaries of German DAX30 companies. At least in some cases, several affiliates are lacking. These are supposed to be predominantly small ones with minor operating activities. However, we consider including virtually all subsidiaries in our sample to be important since certain intermediate group units or small subsidiaries in tax havens might otherwise be disregarded. Next, we took the MiDi database provided by the German Central Bank into consideration. Data collection is enforced by German law⁴⁹ and German companies are required to report their investment positions held abroad if the participation is 10% or more and the balance sheet total of the investment exceeds EUR 3 million.⁵⁰ However, small subsidiaries that fall below the threshold do not have to be reported. This gives rise to the assumption that the database does not include *all* foreign German-controlled subsidiaries. Comparisons of the number of subsidiaries in our hand-collected data set with randomly chosen MiDi-based studies reveal much

⁴⁹ See Section 26 of the Foreign Trade and Payments Act (*Aussenwirtschaftsgesetz*) in connection with the Foreign Trade and Payments Regulation (*Aussenwirtschaftsverordnung*).

⁵⁰ For further information about MiDi, see Lipponer (2009).

higher numbers in our case. Therefore, to ensure that the number of subsidiaries is correctly specified and to yield a comprehensive picture of the affiliates of German DAX30 companies held abroad, we hand-collect our data. Due to the high level of effort required for data collection, we concentrate solely on the German DAX30 companies. Extending the sample, for example, to non-listed firms offers room for further research.

We source the enumeration of all subsidiaries from the full list of shareholdings which is part of the group appendix according to German commercial law.⁵¹ The full lists of shareholdings are published in the electronic German Federal Gazette (www.ebundesanzeiger.de) and the commercial register or they are available on the firm websites. Our sample period covers the years 2005 to 2009. To avoid survivorship bias, we include parent companies that have been listed in the DAX30 at any time during the sample period. Furthermore, we restrict our data set to non-financial firms since financial firms apply different accounting methods. This leads us to 29 parent companies. We collect all subsidiaries (legally independent entities) each parent company holds per year. However, data does not allow differentiating between types of subsidiaries (e.g., operative units, holding companies). Although this differentiation seems to be desirable, anecdotal evidence shows that multinationals often establish mixtures of different types, e.g., to avoid CFC rules applicable on passive income only. Taking all five years together, we accumulate a total number of 76,442 subsidiaries located in 189 different countries. For each subsidiary, we obtain information on its location, the group equity share (in %), and its scope of consolidation.⁵² For a number of 43,161 affiliates, information on equity is available.

⁵¹ See Section 313 (2) and Section 285 No. 11 of the German Commercial Code (*Handelsgesetzbuch*).

⁵² We are able to differentiate between consolidated affiliates, non-consolidated affiliates, associated companies and joint ventures. However, about 70% of the subsidiaries included in our initial sample are consolidated affiliates.

We employ the number of subsidiaries that German multinational enterprises operate per year in different host countries to analyze the determinants of location decisions. The number of affiliates represents the sum of location choices in favor of a distinct country. Therefore, we count the subsidiaries that parent company j holds in year t in host country i . This provides us with the dependent variable of main interest, *Number Subsidiaries*.⁵³ For the purpose of more detailed analyses and to be able to conduct robustness tests, we generate certain alternative dependent variables. First, we count the number of consolidated subsidiaries (*Number Cons. Subsidiaries*) that parent company j holds in year t in host country i . Next, we generate *Number Subsidiaries (relative)*, defined as the number of subsidiaries that parent company j holds in year t in host country i divided by the total sum of foreign subsidiaries that parent company j holds in year t . Furthermore, we sum up the equity that parent company j holds in year t in host country i measured in mill. EUR (*Equity*). We also generate *Equity (relative)*, defined as the sum of equity that parent company j holds in year t in host country i divided by the total sum of the equity that parent company j holds in year t in foreign countries. For an aggregated analysis, we count the subsidiaries that all 29 parent companies together hold in year t in host country i (*Number Subsidiaries (all)*).

As a next step, we merge the tax data (*Tax Attractiveness Index*) with our firm sample. Complete tax data are available for 100 countries, including Germany. However, we analyze the location of German-controlled subsidiaries *abroad*. Hence, we exclude Germany as a host country. In addition, we have to drop observations for the British Virgin Islands and Jersey due to a lack of country-level control variables presented in the next section. Thus, our analysis is based on 97 countries and our initial

⁵³ The following example illustrates our approach: if parent company 1 operates five affiliates in Spain in year 2006, then *Number Subsidiaries* equals five.

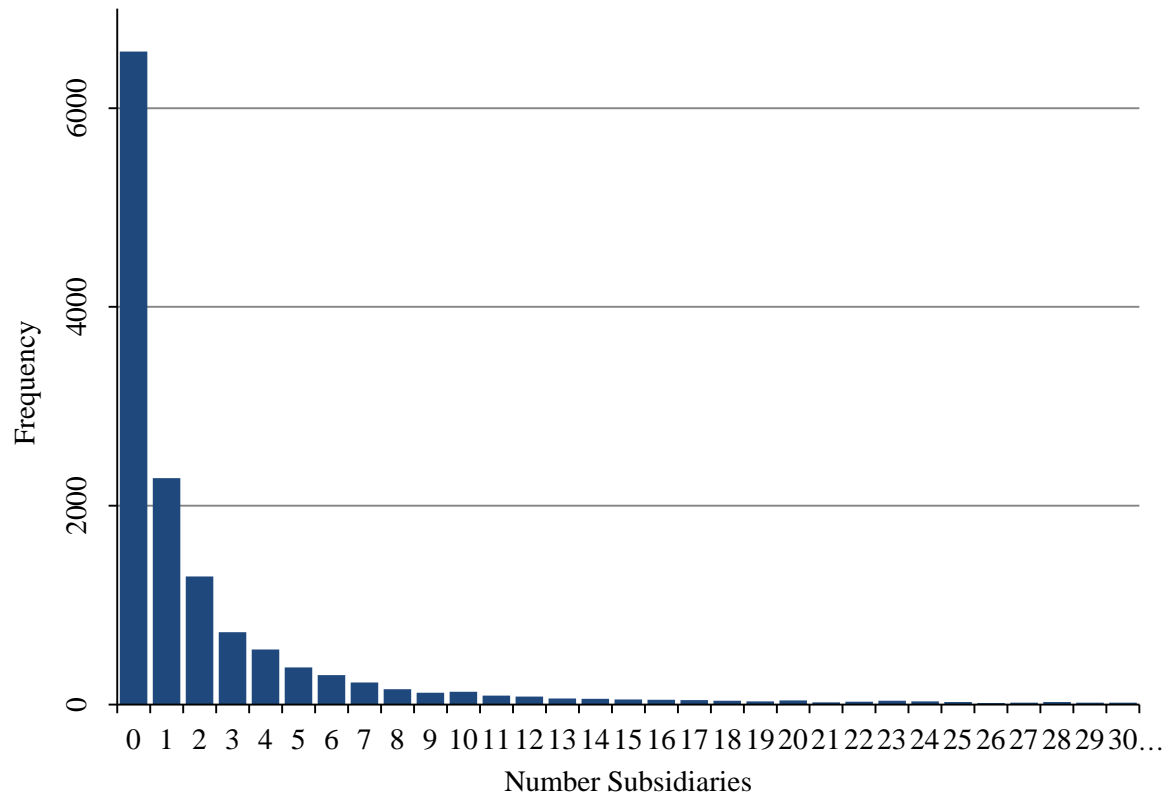
sample contains 14,065 observations (29 parent companies \times 5 years \times 97 countries). We have to drop observations for Belarus 2005, as we lack tax information (minus 29 observations), and for three parent companies for which we do not have access to the list of shareholdings for 2005 (minus 3 parent companies \times 96 remaining countries for 2005 = 288 observations). Our final sample consists of 13,748 observations representing 97 different host countries.⁵⁴

The dependent variable that we apply in our main analysis is *Number Subsidiaries*. Figure 4-1 displays its distribution, revealing that our data set contains 6,668 zeros (~ 47.77%).

⁵⁴ Thus, we finally capture 53,078 of the initial 76,442 subsidiaries.

Figure 4-1: Distribution of *Number Subsidiaries*

Figure 4-1 displays the distribution of *Number Subsidiaries*, defined as the number of subsidiaries that parent company j operates in year t in host country i . The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries.



The high number of zeros can be explained by the fact that each of our 29 parent companies does not operate subsidiaries in all 97 host countries in each year of the sample period. We will address the issue of excess zeros in the next chapter. Summary statistics for all dependent variables used in this study are presented in Table 4-2 Panel A.

Table 4-2: Descriptive Statistics

Table 4-2 reports descriptive statistics for all variables used in this study. Summary statistics for different dependent variables are presented in Panel A. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. *Number Subsidiaries* signifies the number of subsidiaries that parent company j operates in year t in host country i . *Number Subsidiaries (relative)* is defined as the number of subsidiaries that parent company j operates in year t in host country i divided by the total number of foreign subsidiaries that parent company j holds in year t . *Equity* is the sum of equity (in current mill. EUR) that parent company j holds in year t in host country i . *Equity (relative)* is the sum of equity (in current mill. EUR) that parent company j holds in year t in host country i divided by the total sum of equity that parent company j holds in year t in foreign countries. *Number Cons. Subsidiaries* refers to the number of consolidated subsidiaries that parent company j operates in year t in host country i . *Number Subsidiaries (all)* is the aggregated number of subsidiaries that all 29 parent companies together operate in year t in host country i . Summary statistics for country-level criteria are reported in Panel B. The *Tax Attractiveness Index* is an index summarizing 18 different tax factors representing host country i 's tax attractiveness. The index is restricted to values between zero and one. High index values indicate a favorable tax environment. *GDP* is the natural logarithm of host country i 's GDP in constant USD for the year 2000. *Similarity* is an index defined as one minus the ratio of the absolute value of host country i 's GDP per capita minus Germany's GDP per capita to the higher of both GDPs per capita (GDP per capita in constant USD for the year 2000, respectively). *Distance* is defined as the natural logarithm of the population-weighted distance between main agglomerations of Germany and host country i . *Adjacency* is a dummy variable obtaining the value of one if host country i shares a border with Germany. *Rule of Law* and *Voice & Accountability* represent governance indicators of host country i . They may range from -2.5 to 2.5. All country-level variables are measured on an annual basis. See Appendix C for information about country-level variables and data sources.

Panel A: Summary Statistics for Dependent Variables

| Variable | N | Mean | Std. Dev. | Min. | Median | Max. |
|----------------------------|--------|---------|-----------|-------------|--------|------------|
| Number Subsidiaries | 13,748 | 3.861 | 16.564 | 0.000 | 1.000 | 524.000 |
| Number Subsidiaries (rel.) | 13,748 | 0.007 | 0.022 | 0.000 | 0.001 | 0.631 |
| Equity | 13,748 | 196.143 | 1,950.583 | -19,808.400 | 0.000 | 92,177.000 |
| Equity (relative) | 13,748 | 0.006 | 0.040 | -1.866 | 0.000 | 0.933 |
| Number Cons. Subsidiaries | 13,748 | 2.848 | 14.590 | 0.000 | 0.000 | 515.000 |
| Number Subsidiaries (all) | 484 | 109.973 | 239.639 | 0.000 | 35.000 | 2,056.000 |

Panel B: Summary Statistics for Country-Level Variables

| Variable | N | Mean | Std. Dev. | Min. | Median | Max. |
|--------------------------|--------|--------|-----------|--------|--------|--------|
| Tax Attractiveness Index | 13,748 | 0.520 | 0.149 | 0.166 | 0.508 | 0.889 |
| GDP | 13,748 | 24.891 | 1.854 | 20.846 | 24.945 | 30.088 |
| Similarity | 13,748 | 0.367 | 0.310 | 0.011 | 0.240 | 0.998 |
| Distance | 13,748 | 8.117 | 1.088 | 5.934 | 8.481 | 9.810 |
| Adjacency | 13,748 | 0.093 | 0.290 | 0.000 | 0.000 | 1.000 |
| Rule of Law | 13,748 | 0.383 | 0.995 | -1.914 | 0.508 | 1.964 |
| Voice & Accountability | 13,748 | 0.376 | 0.908 | -1.774 | 0.537 | 1.782 |

Number Subsidiaries ranges from zero to 524. The mean is 3.861, revealing that each German DAX30 company operates, on average, 3.861 subsidiaries in each of the 97 host countries per year. *Number subsidiaries (all)* has a minimum of zero and a maximum of 2,056 affiliates, with a mean of about 110, i.e., the German DAX30 companies together have, on average, 110 subsidiaries in each of the 97 host countries per year. Comparing the mean and median of *Number Subsidiaries* and of *Number Subsidiaries (all)* shows that variance is high in both cases. Equity of one parent company in one host country goes up to 92 billion EUR per year.

4.3.3 Econometric Approach

4.3.3.1 General Econometric Framework

As we want to consider the fact that multinationals might operate more than one subsidiary in one host country, we apply count data regression models. We employ *Number Subsidiaries* that reflects the number of subsidiaries that parent company j holds in year t in host country i to analyze the effect of taxation on the location decisions of German multinational enterprises. Thus, our main dependent variable is a count variable, meaning that it has only non-negative integer outcomes. A natural starting point for the analysis of count data is the Poisson regression model.⁵⁵ However, the Poisson model implies that the mean of the count variable is equal to the conditional variance (*equidispersion*) (see, e.g., Winkelmann and Zimmermann 1995). In applied research, this assumption is frequently violated. Table 4-2 Panel A reveals that this is also true in our case: the variance of *Number Subsidiaries* clearly exceeds its mean, revealing that our data are overdispersed. Further formal tests we conduct to reinsure

⁵⁵ For a detailed technical description of the underlying econometric framework, see Appendix D.

descriptive examination likewise reject the null hypothesis of equidispersion. *Number Cons. Subsidiaries* and *Number Subsidiaries (all)* that we use as alternative dependent count variables suffer from overdispersion as well. Hence, the Poisson model is not appropriate in our application. However, as it is widely applied, we use it as a benchmark.

Next, we take the negative binomial model into consideration since it is more flexible than the Poisson model. In the negative binomial model, the conditional variance is specified differently and, thus, it allows for overdispersion. Specification tests that compare different model-fits confirm that the negative binomial model is more suitable for our data. Therefore, we employ the negative binomial model as the preferred specification in our empirical estimations. Precisely, we apply the negative binomial model of type 2 that allows for overdispersion which increases with the conditional mean (see, e.g., Cameron and Trivedi 1998).⁵⁶

Furthermore, we account for the fact that zero is a frequent observation for *Number Subsidiaries*. A zero-inflated negative binomial model is able to handle the large number of zeros. Therefore, we apply it as an alternative to the negative binomial model (see, e.g., Cameron and Trivedi 2010).⁵⁷

Moreover, we use OLS estimation as an alternative to count data models. In our robustness checks, the dependent variable is sometimes not a count variable (such as *Number Subsidiaries (relative)*, *Equity* and *Equity (relative)*). In those cases, we only use OLS estimation.

⁵⁶ Becker et al. (2012) and Overesch and Wamser (2009) also opt for this version of the negative binomial model.

⁵⁷ Working with count data, there is typically no clear cut-off determining that one model fits better than another. In our case, specification tests suggest both the negative binomial and the zero-inflated negative binomial model.

4.3.3.2 Regression Equation

Apart from the *Tax Attractiveness Index*, we include several country-level control variables to model the location decisions of multinational enterprises. Applying count data models, we estimate the following regression (with host country i , parent company j and year t):

$$\begin{aligned} \text{Number Subsidiaries}_{ijt} = & \alpha_0 + \beta_1 \text{Tax Attractiveness Index}_{it} + \beta_2 \text{GDP}_{it} + \beta_3 \text{Similarity}_{it} \\ & + \beta_4 \text{Distance}_{it} + \beta_5 \text{Adjacency}_{it} + \beta_6 \text{Rule of Law}_{it} \\ & + \beta_7 \text{Voice \& Accountability}_{it} + \alpha_{jt} + \varepsilon_{ijt} \end{aligned} \quad (1)$$

As non-tax parameters that may affect the location decision and, hence, the number of subsidiaries, we take account of *GDP*, *Similarity*, *Distance*, *Adjacency*, *Rule of Law* and *Voice & Accountability*. All country-level control variables are measured on an annual basis. Moreover, we include parent-year fixed effects (α_{jt}) to control for exogenous firm-year characteristics. However, in alternative specifications, parent and year fixed effects are incorporated separately. The error term is denoted with ε_{ijt} .

Our independent variable of interest is the *Tax Attractiveness Index*. The higher the score, the more attractive the tax environment offered by a host country. Therefore, we expect the *Tax Attractiveness Index* to have a positive effect on the location decisions of multinational enterprises and, thus, we expect it to be positively associated with *Number Subsidiaries*. Since our sample period covers only five years, the *Tax Attractiveness Index* does not show sufficient within-country variation over time. Hence, the identification of the index as a regressor relies on its cross-country variation. For this reason, we pool the data over time, providing us with a pooled cross-sectional data set. Accordingly, we refrain from using panel data models, but we apply pooled estimation techniques. However, as a consequence, standard errors may be correlated over time on a within-country basis. To prevent standard errors from being biased, we

take two different measures: first, we include year-fixed effects to control for special time effects. Second, we cluster the standard errors by country.⁵⁸

In accordance with the existing literature on the determinants of the location decision, we take *GDP* as a first control variable (see Overesch and Wamser 2009, 2010; Buettner and Ruf 2007). *GDP* captures the size of the host market and, therefore, we expect it to be positively related to *Number Subsidiaries*. *GDP* is defined as the natural logarithm of host country *i*'s gross domestic product measured in constant U.S. dollars, based on the year 2000. Second, we include *Similarity* as a proxy for similarity in the endowment with skills and human capital. *Similarity* is an index expressing the difference between Germany's GDP per capita and the GDP per capita of the host country (see Buch et al. 2005).⁵⁹ It is based on the assumption that a higher GDP represents higher productivity. Though, recent literature suggests using measures, such as school enrollment, that reflect the endowment with skilled labor more explicitly (see Carr et al. 2001; Overesch and Wamser 2009). Barrios et al. (2012) apply the logarithm of labor costs. However, data coverage for most of the 97 sample countries is poor. This is why we rely on the *Similarity* index. *Similarity* ranges between zero and one, with high values indicating that countries are more similar. Expectations regarding the sign of *Similarity* are ambiguous (see, e.g., Barrios et al. 2012). If market access motives dominate (horizontal model), enterprises are more likely to establish subsidiaries in countries that are similar (see, e.g., Markusen 1984, 2002). This would lead to an expectation of a positive coefficient for *Similarity*. In contrast, if production costs-

⁵⁸ The clustering by country-year results in lower standard errors. To apply the most conservative specification, we therefore cluster standard errors by country. Moreover, standard errors allow for heteroskedasticity.

⁵⁹ The corresponding formula can be written as: $1 - (\text{abs}[GDP \text{ per capita}_{it} - GDP \text{ per capita DEU}_t]) / \max[GDP \text{ per capita}_{it}, GDP \text{ per capita DEU}_t]$ (Buch et al. 2005). *GDP per capita* is measured in constant U.S. dollars based on the year 2000, respectively.

savings motives dominate (vertical model), companies set up affiliates in countries which are dissimilar in their endowment with human capital and skilled labor (see, e.g., Helpman 1984, 1985). This is an argument for a negative association between *Similarity* and *Number Subsidiaries*.

Next, we control for the geographic distance between Germany and the respective host country.⁶⁰ Primarily, geographic distance is regarded as a proxy for transportation costs. Moreover, it may capture cultural distance and, therefore, reflect communication and information costs incurred due to language barriers and differing business practices (see Buch et al. 2005; Carr et al. 2001; Overesch and Wamser 2009). Thus, geographic distance should have a negative effect on the location decisions of multinational enterprises. We apply two different measures for geographic distance: first, we use *Distance*, defined as the distance between Germany's main agglomeration and the main agglomeration of host country *i*, weighted by the share of the agglomeration in the overall country's population, respectively, provided by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) (see Mayer and Zignago 2011). Second, we include a dummy variable, obtaining a value of one if host country *i* shares a border with Germany (*Adjacency*) (see, e.g. Barrios et al. 2012). While we anticipate a negative coefficient for *Distance*, we expect *Adjacency* to have a positive sign.

Finally, we control for the perceptions of governance in respective host countries using the *World Governance Indicators* developed by Kaufmann et al. (2010). The authors differentiate six dimensions of governance. We opt for including *Rule of Law*

⁶⁰ This is in line with the gravity approach that explains international activity by a combination of mass variables (e.g., GDP and population) and distance variables (see, e.g., Bellak et al. 2009).

and *Voice & Accountability*.⁶¹ *Rule of Law* reflects the level to which negotiators have confidence in, and stick to the rules of society. It captures particularly the quality of contract enforcement, property rights, the police, as well as the probability of crime and violence in host country *i*. *Voice & Accountability* indicates the degree to which citizens of host country *i* are given the possibility to elect their government. In addition, it represents the extent to which the freedom of expression, the freedom of association and a free media are established. Both governance indicators may range between -2.5 and 2.5. The higher the score, the better is the perception of governance. Hence, we expect both variables to be positively related with *Number Subsidiaries*. Appendix C provides detailed descriptions of the independent variables used in this study as well as the corresponding data sources. Table 4-2 Panel B summarizes descriptive statistics for all country-level parameters. The *Tax Attractiveness Index* ranges between 0.166 indicating the score for Argentina in 2009, and 0.889 reflecting the score for Bermuda and the Bahamas in years 2005 to 2009. The mean and median of the index are close to 0.5. It can be seen that all variables show sufficient variation. In the appendix, Table E.I presents a correlation matrix for all dependent and independent variables applied in this study.

4.4 Results

4.4.1 Graphical Evaluation

As a first step, we graphically analyze the location of German-controlled subsidiaries. Figure 4-2 gives an impression of where parent countries included in our sample place their affiliates. On the abscissa, all 97 sample countries are entered in

⁶¹ Since the parameters are highly correlated with each other, we are not able to include all six indicators.

alphabetical order. On the ordinate, the yearly average of *Number Subsidiaries (all)*, defined as the number of affiliates all sample parent companies together operate in year t in host country i is plotted.

The United States and Great Britain host the highest numbers of subsidiaries. From Figure 4-2, it is not possible to deduce motives for the location decisions. However, the increased numbers of affiliates in both countries might be explained by the close relationship and the intense trade connections existing with Germany. The United States and Great Britain are large economies that form important markets for German companies. With regard to the tax environment as expressed by the *Tax Attractiveness Index*, Great Britain has a considerably high score (on average 0.6367) while tax conditions in the United States are weak (on average 0.3781). The third highest number of German-controlled subsidiaries is located in the Netherlands. Although the Netherlands is a neighboring country, this is a somewhat surprising result since the Dutch economy is not among the largest in Europe. The Netherlands, however, offer a very attractive tax environment as indicated by an index value of 0.7400 on average. Consistent with previous studies that have identified the Netherlands as an important holding location (see Mintz and Weichenrieder 2010), there is reason to assume that some German-controlled subsidiaries located there do not serve operative purposes, but are established mainly for tax motives. Furthermore, a considerable number of German-controlled subsidiaries are located in Austria, Switzerland and Belgium, respectively. Since all countries provide favorable tax conditions (index values of on average 0.6603, 0.6428 and 0.6627, respectively), taxation might play a role in locating large numbers of subsidiaries in these countries.

Figure 4-3 focuses on countries hosting, on average, less than 85 German-controlled subsidiaries per year. In this way, it yields a deeper look into the cloud depicted at the bottom of Figure 4-2. Locations with an attractive tax environment as indicated by a high *Tax Attractiveness Index* are highlighted.

Figure 4-3: Location of German-Controlled Subsidiaries – Focus on Less-Frequented Countries

Figure 4-3 exhibits where German-controlled subsidiaries are located. On the abscissa, sample countries are entered in alphabetical order. Only countries for which *Number Subsidiaries (all)* is lesser than 85 are displayed. On the ordinate, the average of *Number Subsidiaries (all)* over years 2005 to 2009 is plotted. *Number Subsidiaries (all)* is defined as the number of affiliates that all sample parent companies together operate in year *t* in host country *i*. Locations with an attractive tax environment as indicated by a high *Tax Attractiveness Index* are highlighted. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009.

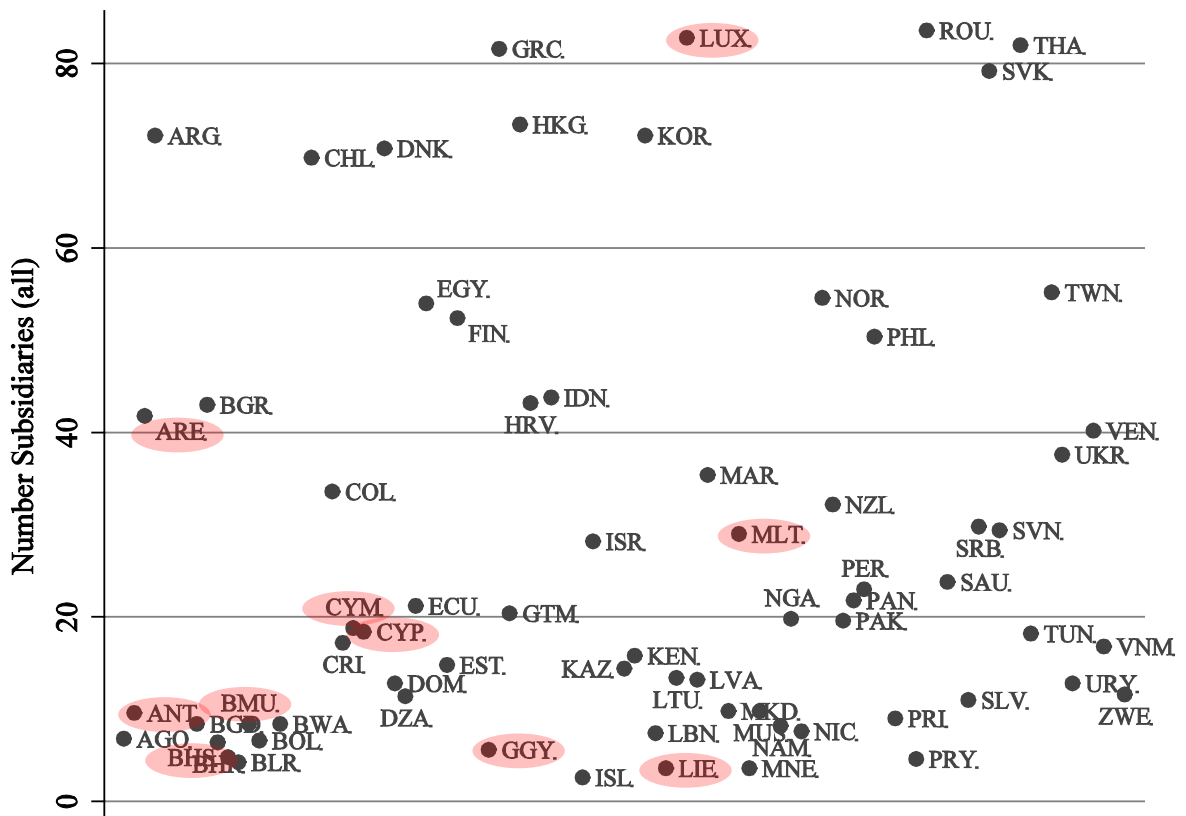


Figure 4-3 reveals that German multinational enterprises operate subsidiaries in classical off-shore tax havens. Affiliates are located in countries such as Bermuda, the Bahamas, the Cayman Islands, and the Netherlands Antilles. Due to the fact that these economies are very small, there is hardly any operative reason to establish subsidiaries there. The same is true for highly tax attractive European countries, such as Luxembourg, Liechtenstein, Malta, Cyprus, and Guernsey. Although absolute figures are low, the mere fact that German multinational enterprises establish subsidiaries in these countries may serve as an indication for tax planning and the existence of tax-optimized group structures. Hence, we can conclude that tax havens play a role in the location decisions of German multinational firms.

4.4.2 Regression Results

Table 4-3 presents results for our regression specified in equation (1). We apply pooled cross-sectional data. Although specification tests reject the Poisson model, we use it as benchmark (column 3). As our preferred model, we apply the negative binomial model since it is more suitable for our analysis (column 1). Results from employing a zero-inflated model are reported in column (2). Moreover, we use OLS estimation as an alternative to count data models (column 4).

Table 4-3: Tax Attractiveness and the Location of Subsidiaries – Main Results

This table reports regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company j operates in year t in host country i . The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In column (1) we use a negative binomial model, in column (2) we apply a zero-inflated model and in column (3) we apply a Poisson model. Column (4) provides results from OLS estimation. To measure host country i 's tax attractiveness, we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. *GDP* is the natural logarithm of host country i 's GDP in constant USD for the year 2000. *Similarity* is an index defined as one minus the ratio of the absolute value of host country i 's GDP per capita minus Germany's GDP per capita to the higher of both GDPs per capita (GDP per capita in constant USD for the year 2000, respectively). *Distance* is defined as the natural logarithm of the population-weighted great circle distance between main agglomerations of Germany and host country i . *Adjacency* is a dummy variable obtaining the value of one if host country i shares a border with Germany. *Rule of Law* and *Voice & Accountability* represent governance indicators of host country i . They may range from -2.5 to 2.5. All country-level variables are measured on an annual basis (2005-2009). We use parent-year fixed effects in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Sign | Negative Binomial (1) | Zero- Inflated (2) | Poisson (3) | OLS (4) |
|--------------------------|------|-----------------------------|--------------------------|------------------------|-----------------------|
| Tax Attractiveness Index | + | 2.0116*** (0.4836) | 2.0365*** (0.4476) | 2.0581*** (0.7146) | 12.0067** (5.2349) |
| GDP | + | 0.7574*** (0.0459) | 0.6682*** (0.0452) | 0.7810*** (0.0474) | 3.1577*** (1.0145) |
| Similarity | +/- | -1.4093*** (0.3318) | -0.9755*** (0.3013) | -1.0913*** (0.3982) | -3.0291 (3.7586) |
| Distance | - | -0.2195*** (0.0576) | -0.0819 (0.0499) | -0.3600*** (0.0895) | -0.8870 (0.7925) |
| Adjacency | + | 0.1099 (0.1914) | 0.1110 (0.1675) | -0.2736 (0.2049) | -2.8066 (3.4141) |
| Rule of Law | + | 0.1509 (0.1112) | 0.0217 (0.1075) | 0.1732 (0.1467) | -0.1010 (1.2365) |
| Voice & Accountability | + | 0.3777*** (0.1082) | 0.3438*** (0.1004) | 0.2072* (0.1184) | 1.7991** (0.8242) |
| Parent FE | | No | No | No | No |
| Year FE | | No | No | No | No |
| Parent-Year FE | | Yes | Yes | Yes | Yes |
| Observations | | 13,748 | 13,748 | 13,748 | 13,748 |
| Pseudo Log L | | -22,545 | -21,670 | -39,308 | |
| R-squared | | | | | 0.1395 |

Results reveal that the *Tax Attractiveness Index* plays a significant role in determining the number of German-controlled subsidiaries in a particular country. As expected, the *Tax Attractiveness Index* is significantly positively associated with *Number Subsidiaries* in all specifications. Hence, we can confirm the hypothesis that an attractive tax environment as measured by the *Tax Attractiveness Index* has a positive influence on the location decisions of multinational enterprises. Regarding the economic interpretation and the magnitude of the effects observed, we focus on the negative binomial model (column 1). Coefficients can be interpreted as semi-elasticities. However, this direct interpretation is not useful in our setting, since a one-unit change in the *Tax Attractiveness Index* cannot be defined. Thus, we make use of the exponentiated coefficients that can be given a multiplicative interpretation (see Cameron and Trivedi 2010). Hence, a one standard deviation increase in the *Tax Attractiveness Index* (about 0.149), which equals approximately the difference in index values between France (0.5840) and the Netherlands (0.7400), is associated with about 35% more subsidiaries ($\exp^{0.149 \times 2.0116} - 1 = 0.35$). Evaluated at the mean of *Number Subsidiaries* (3.861), such an increase in the tax attractiveness represents about one and a half (1.4) additional subsidiaries that a host country attracts from each parent company per year. Therefore, we can conclude that our results are not only statistically significant, but also have an economic impact. Since the *Tax Attractiveness Index* that combines multiple tax factors proves to be highly significant, our findings reveal that location decisions depend on a bundle of tax factors, implying that multinational firms carry out tax planning activities. In line with the graphical evaluation, there is reason to assume that multinational

enterprises make use of intermediate companies to exploit favorable tax provisions in distinct countries, thus increasing the number of subsidiaries located there.⁶²

With regard to the non-tax parameters that we include as country-level control variables, the results in Table 4-3 show that *GDP* has a significant influence on the location of German-controlled subsidiaries. In line with our expectations, the size of the host market is positively associated with *Number Subsidiaries*. Economically, the coefficient for *GDP* can be interpreted as follows: a one standard deviation change in *GDP*, which approximately represents the difference in *GDP* between Great Britain and Belgium, is related to about 12 additional affiliates (evaluated at the mean of *Number Subsidiaries*). In accordance with Overesch and Wamser (2009), we find a significantly negative effect for *Similarity*, which is used as a proxy for differences in the endowment with skilled labor. This allows the conclusion that cost-saving motives realized by differences in factor prices are relevant for location decisions as proposed by the vertical model. In magnitude, the coefficient for *Similarity* is very close to the estimates presented in Overesch and Wamser (2009). Moreover, our analysis confirms the findings of previous studies revealing that *Distance* has a negative impact on location decisions (see, e.g., Buch et al. 2005; Overesch and Wamser 2009; Hebous et al. 2011). Like *GDP* and *Similarity*, *Distance* is also highly significant. In contrast, *Adjacency*, which indicates whether the host country has a common border with Germany, does not have a significant effect; however, the coefficient has the predicted sign. As expected, *Rule of Law* and *Voice & Accountability*, which serve as proxies for the perceptions of governance in the respective host country, are positively associated with the number of

⁶² Our main results hold when the *Tax Attractiveness Index* in its original version (EU-dummy instead of withholding taxes to Germany, see Keller and Schanz 2013a) is applied.

subsidiaries. However, only *Voice & Accountability* proves to be statistically significant.

Qualitatively, the results hold if a zero-inflated model is used (column 2). If alternative model specifications (Poisson model (column 3), the (less adequate) OLS estimation (column 4) or negative binomial and zero-inflated models with separate parent fixed effects and year fixed effects (Table 4-4)) are applied, the *Tax Attractiveness Index* proves to be highly significant. In the OLS regression, however, *Similarity* has no significant influence on the number of subsidiaries. Though, with respect to the magnitude of the coefficients, the different models are not directly comparable.

Table 4-4: Tax Attractiveness and the Location of Subsidiaries – Alternative Specifications

This table presents regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i*. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In column (1) we use a negative binomial model and in column (2) we apply a zero-inflated model. To measure host country *i*'s tax attractiveness we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. *GDP* is the natural logarithm of host country *i*'s GDP in constant USD for the year 2000. *Similarity* is an index defined as one minus the ratio of the absolute value of host country *i*'s GDP per capita minus Germany's GDP per capita to the higher of both GDPs per capita (GDP per capita in constant USD for the year 2000, respectively). *Distance* is defined as the natural logarithm of the population-weighted great circle distance between main agglomerations of Germany and host country *i*. *Adjacency* is a dummy variable obtaining the value one if host country *i* shares a border with Germany. *Rule of Law* and *Voice & Accountability* represent governance indicators of host country *i*. They may range from -2.5 to 2.5. All country-level variables are measured on an annual basis (2005-2009). In both columns, we use parent and year fixed effects separately. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | | Negative Binomial | Zero-Inflated |
|--------------------------|------|------------------------|------------------------|
| | Sign | (1) | (2) |
| Tax Attractiveness Index | + | 1.9863*** (0.4851) | 1.9254*** (0.4511) |
| GDP | + | 0.7570*** (0.0460) | 0.6616*** (0.0450) |
| Similarity | +/- | -1.4222*** (0.3318) | -0.9653*** (0.3003) |
| Distance | - | -0.2168*** (0.0578) | -0.0917* (0.0508) |
| Adjacency | + | 0.1111 (0.1920) | 0.0979 (0.1668) |
| Rule of Law | + | 0.1589 (0.1119) | 0.0478 (0.1066) |
| Voice & Accountability | + | 0.3767*** (0.1077) | 0.3082*** (0.0916) |
| Parent FE | | Yes | Yes |
| Year FE | | Yes | Yes |
| Parent-Year FE | | No | No |
| Observations | | 13,748 | 13,748 |
| Pseudo Log L | | -22,728 | -21,871 |

4.5 Robustness Tests and Further Analyses

4.5.1 Robustness Tests

4.5.1.1 Control for Outliers

As a first robustness test, we control for outliers. Depicting the distribution of *Number Subsidiaries*, Figure 4-1 reveals that the main dependent variable may take on high values (above 20). However, for reasons of readability, Figure 4-1 shows only the first part of the distribution. In fact, *Number Subsidiaries* may equal 100 and more (up to around 500), meaning that in certain years some multinational enterprises hold extremely high numbers of affiliates in distinct countries. Primarily, these countries are the United States and Great Britain; but in Austria, Sweden, the Netherlands, Spain, and Poland enormously high numbers of subsidiaries are also established. Since several of these countries offer an attractive tax environment as indicated by high scores in the *Tax Attractiveness Index* (e.g., the Netherlands and Austria), we try to rule out the possibility that our results are driven by outliers. To address this issue, we cut off high outcomes for *Number Subsidiaries*, yielding us six different samples with decreased numbers of observations, respectively. We run our regression for each of the reduced samples. In all cases, we apply negative binomial regression models. Results are reported in Table 4-5. We find that the coefficient for the *Tax Attractiveness Index* is highly significant in all columns. Hence, our results hold even in the case where high outcomes for *Number Subsidiaries* are excluded.

Table 4-5: Tax Attractiveness and the Location of Subsidiaries – Control for Outliers

This table reports regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i*. The sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. Subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. For all regressions (1-12), we use negative binomial models. To control for outliers, we cut off high outcomes for *Number Subsidiaries*, yielding us six different sub-samples with reduced numbers of observations, respectively. To measure host country *i*'s tax attractiveness in year *t*, we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. See Table 4-1 for a description of the other independent variables included in the regressions. We use parent and year fixed effects separately in columns (1), (3), (5), (7), (9) and (11). In columns (2), (4), (6), (8), (10) and (12), we use parent-year fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Number Subsidiaries < 10 | | Number Subsidiaries < 20 | | Number Subsidiaries < 30 | |
|--------------------------|--------------------------|-----------------------|--------------------------|-----------------------|---------------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Tax Attractiveness Index | 1.4666*** (0.3995) | 1.4809*** (0.4001) | 1.6997*** (0.4513) | 1.7262*** (0.4508) | 1.6599*** (0.4651) | 1.6941*** (0.4618) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | No | Yes | No | Yes | No |
| Year FE | Yes | No | Yes | No | Yes | No |
| Parent-Year FE | No | Yes | No | Yes | No | Yes |
| Observations | 12,571 | 12,571 | 13,192 | 13,192 | 13,453 | 13,453 |
| Pseudo Log <i>L</i> | -16,253 | -16,068 | -19,169 | -18,993 | -20,612 | -20,432 |
| | Number Subsidiaries < 40 | | Number Subsidiaries < 50 | | Number Subsidiaries < 100 | |
| | (7) | (8) | (9) | (10) | (11) | (12) |
| Tax Attractiveness Index | 1.7106*** (0.4781) | 1.7461*** (0.4759) | 1.7812*** (0.4813) | 1.8135*** (0.4801) | 1.8153*** (0.4793) | 1.8430*** (0.4783) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | No | Yes | No | Yes | No |
| Year FE | Yes | No | Yes | No | Yes | No |
| Parent-Year FE | No | Yes | No | Yes | No | Yes |
| Observations | 13,566 | 13,566 | 13,632 | 13,632 | 13,695 | 13,695 |
| Pseudo Log <i>L</i> | -21,367 | -21,192 | -21,813 | -21,633 | -22,247 | -22,069 |

4.5.1.2 Alternative Dependent Variables

For further robustness tests, we replace *Number Subsidiaries* with alternative dependent variables. We first provide an analysis of *Number Subsidiaries (relative)*, which is defined as the number of subsidiaries that parent company j operates in year t in host country i divided by the total number of foreign subsidiaries that parent company j holds in year t . Hence, the dependent variable *Number Subsidiaries (relative)* abstracts from absolute numbers. In this way, we address the issue that the denominator representing the total number of affiliates that a certain parent company operates per year in foreign countries differs heavily across our sample. Observations range from around 20 to more than 1,000, revealing that parent companies vary widely in their degree of internationalization. By using the share of affiliates in a certain host country instead of employing the absolute figure, cases in which *Number Subsidiaries* takes on small values may gain importance. Since *Number Subsidiaries (relative)* is not a count variable, we apply OLS estimation. Results are presented in column (1) of Table 4-6.

Table 4-6: Tax Attractiveness and the Location of Subsidiaries – Alternative Dependent Variables

This table reports regression results for the location of German-controlled subsidiaries. As a dependent variable, we use *Number Subsidiaries (relative)* (column 1), defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i* divided by the total number of foreign subsidiaries that parent company *j* holds in year *t*. Moreover, *Equity* is used as a dependent variable (column 2), defined as the sum of equity (in current mill. EUR) that parent company *j* holds in year *t* in host country *i*. In column (3) the dependent variable is *Equity (relative)*, defined as the sum of equity (in current mill. EUR) that parent company *j* holds in year *t* in host country *i* divided by the sum of equity that parent company *j* holds in year *t* in foreign countries. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009 and their respective equity holdings. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In all columns we run OLS regressions. To measure host country *i*'s tax attractiveness in year *t*, we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. See Table 4-2 for a description of the other independent variables included in the regressions. In all columns, we use parent-year fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Number Sub- sidiaries (relative) | Equity | Equity (relative) |
|--------------------------|-------------------------------------|--------------------------|----------------------|
| | (1) | (2) | (3) |
| Tax Attractiveness Index | 0.0223*** (0.0082) | 866.4741** (376.9926) | 0.0265** (0.0104) |
| Controls | Yes | Yes | Yes |
| Parent FE | No | No | No |
| Year FE | No | No | No |
| Parent-Year FE | Yes | Yes | Yes |
| Observations | 13,748 | 13,748 | 13,748 |
| R-squared | 0.1994 | 0.0471 | 0.0668 |

Consistent with our main results, we find that the *Tax Attractiveness Index* has a significantly positive effect on *Number Subsidiaries (relative)*. Thus, our results are robust to altering the dependent variable from absolute to relative values.

Next, we apply the amount of equity that German multinational enterprises locate in foreign countries as a dependent variable. A large strand of literature deals with the influence of taxation on corporate financing structures (see, e.g., Desai et al. 2004; Huizinga et al. 2008; Ramb and Weichenrieder 2005; Buettner et al. 2009). The rationale behind these studies is that, in most countries, interest expenses are deductible for corporate tax purposes while dividends have to be paid out of profits *after* tax. Hence, there is a general incentive to prefer debt financing over equity financing, even for national companies.⁶³ However, multinational enterprises have the opportunity to allocate their debts across countries in the most efficient way by means of internal financing strategies. The deductibility of interest expenses is perceived to be most valuable in high tax countries. From a multinational's perspective, it is therefore advantageous to equip subsidiaries in low tax locations with equity.⁶⁴ Hence, we expect the *Tax Attractiveness Index* to be positively associated with the amount of equity in a particular location. Though, this prediction is not straightforward, since the statutory tax rate alone seems to be the decisive tax parameter for financing structures and some countries have high index values while, at the same time, levying high statutory tax rates. However, there are other tax factors that might incentivize companies to place

⁶³ To prevent the extensive use of debt financing, some countries enforce thin capitalization rules.

⁶⁴ Mintz (2004) suggests that financial structures involving an intermediate entity in a low tax country are used to achieve a double dip of interest deductions. In such cases, the parent company borrows capital and passes it to the intermediate company in the form of equity. The intermediate company, in turn, lends the capital to another subsidiary located in a high tax country. Hence, interest can be deducted twice, once at the level of the high tax affiliate and again at the level of the parent company. Interest is taxed at the level of the intermediate group unit. The overall group tax burden can be decreased if the local tax rate of the interposed company is comparably low or if interest income is subject to a reduced tax rate.

large amounts of equity in certain countries, such as a notional interest deduction or a preferential tax treatment of interest income.⁶⁵ These special regimes can be found in countries that offer an attractive tax environment in general as indicated by the *Tax Attractiveness Index*. Hence, we expect the *Tax Attractiveness Index* to have a positive effect on the amount of equity. We apply two different measures for equity: first, we use *Equity*, defined as the sum of equity (in mill. EUR) that parent company j holds in year t in host country i (weighted by the respective share in equity). Second, we employ *Equity (relative)* defined as the sum of equity that parent company j holds in year t in host country i divided by the total sum of equity that parent company j holds in year t in foreign countries. Results from OLS estimations are reported in columns (2) and (3) of Table 4-6. We find that the coefficient for the *Tax Attractiveness Index* is significant in both cases, revealing that a host country's tax environment has a positive effect on the amount of equity that German multinational enterprises allocate there.

As a further robustness check, we restrict our sample to a parent company's fully consolidated subsidiaries. By using *Number Cons. Subsidiaries* as a dependent variable, we try to proxy for the most important subsidiaries of a multinational group. Thereby, we rule out the possibility that multinational enterprises place primarily those subsidiaries in attractive tax locations that are not directly included in the group's consolidated financial statements, such as special purpose entities. Since *Number Cons. Subsidiaries* is a count variable, we use negative binomial as well as zero-inflated models. As a benchmark, we apply OLS estimation. Table 4-7 reports regression results. In all specifications, the *Tax Attractiveness Index* shows a significantly positive

⁶⁵ A notional interest deduction applies, for instance, in Belgium. It allows the deduction of a fictitious interest on equity.

coefficient, indicating that an attractive tax environment is linked with an increased number of consolidated subsidiaries.

Table 4-7: Tax Attractiveness and the Location of Subsidiaries – Consolidated Subsidiaries

This table presents regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Cons. Subsidiaries*, defined as the number of consolidated subsidiaries that corporate group *j* operates in year *t* in host country *i*. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In columns (1) and (2) we use negative binomial models and in columns (3) and (4) we apply zero-inflated models. Column (5) provides results from OLS estimation. To measure host country *i*'s tax attractiveness in year *t*, we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. See Table 4-2 for a description of the other independent variables included in the regressions. We use parent and year fixed effects separately in columns (1) and (3). In columns (2), (4) and (5) we use parent-year fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Negative Binomial | | Zero-Inflated | | OLS |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Tax Attractiveness Index | 2.0921*** (0.4825) | 2.1169*** (0.4806) | 1.8172*** (0.4221) | 1.8162*** (0.4243) | 8.8622** (3.9853) |
| Controls | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | No | Yes | No | No |
| Year FE | Yes | No | Yes | No | No |
| Parent-Year FE | No | Yes | No | Yes | Yes |
| Observations | 13,748 | 13,748 | 13,748 | 13,748 | 13,748 |
| Pseudo Log L | -19,347 | -19,170 | -18,504 | -18,274 | |
| R-squared | | | | | 0.1077 |

Finally, we use *Number Subsidiaries (all)* as an alternative dependent variable. It specifies how many affiliates all parent companies together operate in year t in host country i . Since we refrain from considering each parent country separately, this enables us to analyze the location decisions of German multinational enterprises in aggregated form (see Figures 4-2 and 4-3). We run count data models and OLS estimation.⁶⁶ Results are presented in Table 4-8; our result holds. Taking an aggregated view, the *Tax Attractiveness Index* still has a significant impact on the number of subsidiaries and, thus, on the location decisions of German multinational enterprises. All coefficients for the control variables show the same signs as in our initial regression. Significance levels also correspond to those depicted in Table 4-3.

⁶⁶ Zero is not a frequent observation for *Number Subsidiaries (all)*. Therefore, we refrain from using a zero-inflated negative binomial model.

Table 4-8: Tax Attractiveness and the Location of Subsidiaries – Aggregated Country Analysis

This table reports regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries (all)* defined as the aggregated number of subsidiaries that all 29 parent firms together operate in year t in host country i . The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In column (1) we use a Poisson model and in column (2) we apply a negative binomial model. Column (3) provides results from OLS estimation. To measure host country i 's tax attractiveness, we use the *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. *GDP* is the natural logarithm of host country i 's GDP in constant USD for the year 2000. *Similarity* is an index defined as one minus the ratio of the absolute value of host country i 's GDP per capita minus Germany's GDP per capita to the higher of both GDPs per capita (GDP per capita in constant USD for the year 2000, respectively). *Distance* is defined as the natural logarithm of the population-weighted great circle distance between main agglomerations of Germany and host country i . *Adjacency* is a dummy variable obtaining the value of one if host country i shares a border with Germany. *Rule of Law* and *Voice & Accountability* represent governance indicators of host country i . They may range from -2.5 to 2.5. All country-level variables are measured on an annual basis (2005-2009). We use year fixed effects in all specifications. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Sign | Poisson (1) | Negative Binomial (2) | OLS (3) |
|--------------------------|------|------------------------|-----------------------------|--------------------------|
| Tax Attractiveness Index | + | 2.0581*** (0.7146) | 1.8466*** (0.5314) | 339.5234** (149.1137) |
| GDP | + | 0.7810*** (0.0474) | 0.7152*** (0.0504) | 89.5404*** (28.9183) |
| Similarity | +/- | -1.0913*** (0.3982) | -1.0965*** (0.3633) | -85.7372 (107.2067) |
| Distance | - | -0.3600*** (0.0895) | -0.1930*** (0.0616) | -25.2103 (22.6436) |
| Adjacency | + | -0.2736 (0.2049) | 0.1822 (0.2113) | -79.4900 (97.4930) |
| Rule of Law | + | 0.1732 (0.1467) | 0.0934 (0.1029) | -2.4588 (35.4062) |
| Voice & Accountability | + | 0.2072* (0.1184) | 0.3391*** (0.1107) | 50.6179** (23.4152) |
| Year FE | | Yes | Yes | Yes |
| Observations | | 484 | 484 | 484 |
| Pseudo Log L | | -6,999 | -2,198 | |
| R-squared | | | | 0.4064 |

4.5.1.3 Breakdown by Year

Our data are structured as a pooled cross-section since the *Tax Attractiveness Index* does not yield sufficient within-country variation over time. However, this may lead to artificially increased levels of significance since we treat each parent-country observation independently even though they may be correlated over time (see section 4.3.3.2). Therefore, as a further robustness check, we provide analysis of a breakdown by year. Analogical to our main investigation, *Number Subsidiaries* is employed as a dependent variable. Results from running individual cross-sectional regressions are reported in Table 4-9. We apply negative binomial as well as zero-inflated models. Regression outputs show that results are robust. In all annual analyses, the *Tax Attractiveness Index* is significantly positively associated with the number of subsidiaries. Hence, our main result is not biased from pooling the data.

Table 4-9: Tax Attractiveness and the Location of Subsidiaries – Breakdown by Year

This table presents regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i*. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We break down the sample by year. Results of annually analyses are reported. We apply cross-sectional estimation techniques. For regressions (1)-(5), we use negative binomial models. In columns (6)-(10) we apply zero-inflated models. To measure host country *i*'s tax attractiveness in year *t*, we use the self-constructed *Tax Attractiveness Index*. The index summarizes 18 different tax factors and is restricted to values between zero and one. High index values indicate a favorable tax environment. See Table 4-2 for a description of the other independent variables included in the regressions. In all specifications, we use parent fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Negative Binomial | | | | |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| | (1) | (2) | (3) | (4) | (5) |
| Tax Attractiveness Index | 1.9914*** (0.4842) | 1.9154*** (0.4668) | 2.2058*** (0.5184) | 1.9687*** (0.5352) | 2.0333*** (0.5510) |
| Controls | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,496 | 2,813 | 2,813 | 2,813 | 2,813 |
| Pseudo Log <i>L</i> | -3,907 | -4,327 | -4,692 | -4,798 | -4,811 |
| | Zero-Inflated | | | | |
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| | (6) | (7) | (8) | (9) | (10) |
| Tax Attractiveness Index | 1.9028*** (0.4897) | 1.9722*** (0.4489) | 2.0991*** (0.5027) | 2.0912*** (0.5036) | 1.8021*** (0.4949) |
| Controls | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,496 | 2,813 | 2,813 | 2,813 | 2,813 |
| Pseudo Log <i>L</i> | -3,784 | -4,136 | -4,485 | -4,606 | -4,622 |

4.5.2 Further Analyses

4.5.2.1 Statutory Tax Rate and Location Decision

For further analysis, we investigate whether the statutory tax rate can explain the location decision of multinational enterprises and, hence, the number of subsidiaries. In previous studies, the statutory tax rate is often used to identify a country's tax environment (see, e.g., Devereux and Griffith 1998; Buettner and Ruf 2007). We analyze the impact of the statutory tax rate in order to compare it to the influence of the *Tax Attractiveness Index*. Applying count data models, we run our regression with the statutory tax rate in replacement of the *Tax Attractiveness Index*. Since we employ the statutory tax rate without modifications (i.e., not in standardized form as it enters the *Tax Attractiveness Index*), we expect it to be negatively associated with *Number Subsidiaries*. Regression results are presented in Table 4-10.

Table 4-10: Tax Attractiveness and the Location of Subsidiaries – Statutory Tax Rate

This table reports regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company j operates in year t in host country i . The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. We apply pooled estimation techniques. In columns (1) and (2), we use negative binomial models and in columns (3) and (4) we apply zero-inflated models. Column (5) provides results from estimating a Poisson model. To measure host country i 's tax attractiveness in year t , we use the statutory tax rate imposed. See Table 4-2 for a description of the other independent variables included in the regressions. We use parent and year fixed effects in columns (1) and (3). In columns (2), (4) and (5), we use parent-year fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | Negative Binomial | | Zero-Inflated | | Poisson |
|--------------------|-------------------|----------|---------------|----------|-----------|
| | (1) | (2) | (3) | (4) | (5) |
| Statutory Tax Rate | -1.4256* | -1.4183* | -0.9824 | -0.9476 | -2.2122** |
| | (0.8291) | (0.8237) | (0.6677) | (0.6543) | (1.0123) |
| Controls | Yes | Yes | Yes | Yes | Yes |
| Parent FE | Yes | No | Yes | No | No |
| Year FE | Yes | No | Yes | No | No |
| Parent-Year FE | No | Yes | No | Yes | Yes |
| Observations | 13,748 | 13,748 | 13,748 | 13,748 | 13,748 |
| Pseudo Log L | -22,842 | -22,665 | -22,015 | -21,803 | -39,679 |

In all specifications and in line with previous studies (see, e.g., Buettner and Ruf 2007; Overesch and Wamser 2009, 2010), the statutory tax rate has the predicted sign. However, in the zero-inflated model, it proves to be insignificant. In the negative binomial as well as in the Poisson model, we find a significant effect of the statutory tax rate. However, levels of significance are not as high as in the *Tax Attractiveness Index*. Also, the pseudo-log likelihood is lower in comparison with models where the *Tax Attractiveness Index* is applied (see Tables 4-3 and 4-4). From this, we can conclude that the *Tax Attractiveness Index* can better explain the location decisions of multinational enterprises than can the statutory tax rate alone. An explanation of this, perhaps surprising, result is that the index and the statutory tax rate are not necessarily highly correlated with each other. Some countries offer an attractive tax environment as indicated by the *Tax Attractiveness Index* although they impose high statutory tax rates (e.g., the Netherlands and Belgium). Our findings reveal that the location decision depends on a bundle of tax factors as combined in the *Tax Attractiveness Index* rather than solely on the statutory tax rate. Previous studies may thus have underestimated the influence of taxation on location decisions. This leaves room for further research.

4.5.2.2 Decomposing the Tax Attractiveness Index

To shed light on the question of which of the tax factors included in the *Tax Attractiveness Index* mainly drive our finding of an influence on location decisions, we decompose the index. Due to the fact that all 18 index components are highly correlated with each other, we refrain from analyzing them separately. We rather establish six subcategories. The first one comprises the statutory tax rate (*STR*), the taxation of dividends (*DIV*), and the taxation of capital gains (*CG*) summarizing corporate tax rates.

To obtain *STR_DIV_CG*, we add values for the three single elements and divide the sum by three. Accordingly, for *WHT*, we add all measures for withholding taxes and divide the sum by six. The next subcategory is *LCB_LCF_GROUP*, consisting of the figures for loss offset possibilities and the option to file a consolidated tax return. *THIN_CFC_AAL* summarizes all anti-avoidance measures (thin capitalization rules, controlled foreign corporation rules, and the general anti-avoidance legislation). To obtain *DTT_HOLD*, we add values for the double tax treaties concluded (*DTT*) and the existence of a holding regime (*HOLD*). We treat the personal income tax rate (*PIT*) solely. To identify the key drivers of our result, we run our regression with each of the six subcategories once serving as a substitute for the *Tax Attractiveness Index*. We apply negative binomial models. Analogously to the index, we expect a positive coefficient for all subcategories.

Table 4-11: Tax Attractiveness and the Location of Subsidiaries – Decomposing the Tax Attractiveness Index

This table reports regression results for the location of German-controlled subsidiaries. The dependent variable is *Number Subsidiaries*, defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i*. The underlying sample is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. The *Tax Attractiveness Index* summarizes 18 different tax factors representing host country *i*'s tax attractiveness in year *t*. Analogical to the index, all tax factors included are restricted to values between zero and one. High values indicate favorable tax conditions. We decompose the index by establishing six subcategories. We run regressions with each subcategory as an independent variable, respectively. Pooled estimation techniques are applied. For all specifications, we use negative binomial models. To obtain *STR_DIV_CG*, we add values for the statutory tax rate (*STR*), taxation of dividends (*DIV*) and taxation of capital gains (*CG*) and divide the sum by three. For *WHT*, we add all measures for withholding taxes and divide the sum by six (*WHTD*, *WHTI* and *WHTR* indicate withholding taxes on dividends, interest and royalties, respectively. *WHTDG*, *WHTIG* and *WHTRG* indicate the respective withholding taxes in relation to Germany). To obtain *LCB_LCF_GROUP*, we add values for loss carry back (*LCB*), loss carry forward (*LCF*) and group taxation (*GROUP*) possibilities and divide the sum by three. For *THIN_CFC_ALL*, we add values for thin capitalization rules (*THIN*), controlled foreign corporation rules (*CFC*) and anti-avoidance legislation (*AAL*) and divide the sum by three. Adding values for double tax treaties (*DTT*) concluded and the existence of a holding regime (*HOLD*) and dividing the sum by two yields *DTT_HOLD*. *PIT* denotes the personal income tax rate. See Table 4-2 for a description of the other independent variables included in the regressions. In all specifications, we use parent-year fixed effects. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|--------------------|-----------------------|
| STR_DIV_CG | 0.7554*** (0.2187) | | | | | | 0.3506* (0.2071) |
| WHT | | 1.2691*** (0.4173) | | | | | 1.0308*** (0.3234) |
| LCB_LCF_GROUP | | | 0.6874*** (0.2516) | | | | 0.3186 (0.2556) |
| THIN_CFC_AAL | | | | -0.3935* (0.2320) | | | -0.3932* (0.2116) |
| DTT_HOLD | | | | | 0.8851*** (0.2583) | | 0.8421*** (0.2459) |
| PIT | | | | | | 0.0642 (0.3175) | -0.1354 (0.2721) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Parent-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 13,748 | 13,748 | 13,748 | 13,748 | 13,748 | 13,748 | 13,748 |
| Pseudo Log <i>L</i> | -22,588 | -22,574 | -22,628 | -22,662 | -22,568 | -22,696 | -22,355 |

The regression results reported in Table 4-11 reveal that *STR_DIV_CG* (column 1), *WHT* (column 2), *LCB_LCF_GROUP* (column 3), as well as *DTT_HOLD* (column 5) are separately positively associated with *Number Subsidiaries*. This allows the conclusion that the tax factors behind these subcategories contribute to the positive effect of the *Tax Attractiveness Index* on location decisions.⁶⁷ In contrast, the coefficient for the personal income tax rate is insignificant. Counterintuitively, *THIN_CFC_AAL* shows a significantly negative coefficient. However, this can be explained by the fact that several European countries host high numbers of German-controlled subsidiaries, although the enforcement of certain anti avoidance rules is very common.

Furthermore, we jointly include all six subcategories of the index (column 7). The coefficients for *WHT* as well as *DTT_HOLD* prove to be highly significant, suggesting that low withholding taxes as well as a broad double tax treaty network and the existence of a special holding regime are the key drivers of our results. These tax factors can be identified as being most relevant for the location decisions of German multinational enterprises. Consistent with our analysis in section 4.5.2.1, the statutory tax rate in connection with the taxation of dividends and capital gains also has a significant impact.

4.6 Conclusion and Limitations

This paper analyzes whether taxation has an influence on the location decisions of multinational enterprises. In contrast to previous studies, we are the first to employ a very broad tax measure, the *Tax Attractiveness Index* (see Keller and Schanz 2013a).

⁶⁷ In an alternative analysis, we analyze the six different subcategories without previously summarizing the single tax factors. For example, in the first regression, we include the statutory tax rate, the taxation of dividends, and the taxation of capital gains, separately. Results reveal that the three components are jointly significant. Confirming our results presented in Table 4-11, the same is true for the second (*WHT*), third (*LCF_LCB_GROUP*), and fifth (*DTT_HOLD*) subcategories.

Capturing 18 different tax factors, the index aims at providing a detailed picture of a country's tax conditions. Employing count data regression models, we find that a country's tax environment as measured by the *Tax Attractiveness Index* has a positive effect on the number of German-controlled subsidiaries and, therefore, on the location decisions of German multinational enterprises. Our results indicate that corporate location decisions depend on a bundle of tax factors. Specifically, our analysis reveals that German multinational firms place affiliates in countries that offer favorable tax conditions. Correspondingly, the graphical evaluation shows that German multinational firms operate affiliates in off-shore tax havens. Moreover, they hold an increased number of subsidiaries in countries with extremely attractive tax environments, such as the Netherlands, Belgium, Austria, and Switzerland. Hence, there is reason to assume that multinational firms implement indirect group structures by means of holding companies in third countries and by establishing profit-shifting entities in tax havens. As key drivers for the influence of taxation on location decisions, we identify the withholding taxes that a country imposes as well as its double tax treaty network and the existence of a holding regime. Moreover, in line with previous studies, we reveal that the statutory tax rate is significantly associated with the number of subsidiaries. However, we find that the *Tax Attractiveness Index* can even better explain the location decisions of multinational enterprises. Prior studies that use the statutory tax rate as a tax measure may thus have underestimated the influence of taxation on location decisions. We encourage research to apply the *Tax Attractiveness Index* instead of the statutory tax rate or other effective tax rates in future studies.

However, our study suffers from several limitations. Most of them are inherent in the data set we explore. First, the sample does not yield the linkage *between* the

subsidiaries, making it impossible to explore corporate group *structures*. Therefore, we are not able to analyze whether the affiliates located in favorable tax locations do in fact serve as *intermediate* entities. Moreover, due to the fact that we do not have balance sheet data (e.g., assets, property, plant, and equipment) or any further information (e.g., employees) about the subsidiaries, we are not able to identify the *type* of the respective group unit. Hence, it is impossible to identify whether a certain subsidiary serves predominantly operative purposes or is a pure holding or profit-shifting entity. From the (increased number of) subsidiaries that German multinational enterprises locate in tax attractive countries, we can only assume that at least some of them are holding or financial companies with little operative activities. Finally, the sample period that we have chosen does not cover an overall *event*, such as a tax reform, making it impossible to conduct a *before and after analysis* in the form of, for example, a difference-in-difference approach. Therefore, we are not able to verify a causal link between the *Tax Attractiveness Index* and location decisions.

Nevertheless, our study has several implications. First, the finding of multinational enterprises taking various tax parameters into account when deciding where to locate their subsidiaries is important for governments and politicians. Policy makers might take this into consideration with respect to future tax reforms or the current fight against the tax avoidance of big multinationals (see OECD 2013). Second, researchers might be interested in learning that several tax factors besides the statutory tax rate explain location decisions. Thus, regarding the statutory tax rate as the only important tax signal for a country's attractiveness will not be sufficient in the future. Applying a broad measure, such as the *Tax Attractiveness Index*, in future analyses might help to reveal a more comprehensive picture of a country's tax environment.

Moreover, our investigation reveals that German multinational enterprises place their subsidiaries in tax havens and other tax attractive countries, which supports the assertion that tax motivations, rather than production costs and market access alone, play a role in the location decisions of big multinationals.

5 Conclusion

The present thesis aims at shedding light on the question whether taxation has an influence on the location decisions of multinational enterprises. Existing empirical studies dealing with this topic employ tax measures, such as the statutory corporate tax rate or different effective tax rates, capturing only a very limited number of real-world tax provisions (see, e.g., Buettner and Ruf 2007; Devereux and Griffith 1998). Since there is anecdotal evidence that multinationals include a bundle of tax factors in their decision making (see, e.g., Duhigg and Kocieniewski 2012), existing literature may hence have underestimated the influence of taxation on the location choices of multinational companies.

Therefore, in a first step, the present thesis develops a new tax measure – the *Tax Attractiveness Index*. This index combines 16 different tax factors, many of which have not been integrated in existing tax measures so far. Thus, yielding a detailed picture of a country's tax environment, the *Tax Attractiveness Index* represents a new, innovative approach to measuring the tax attractiveness of a country and the tax planning opportunities offered. The index is constructed for 100 jurisdictions over the years 2005 to 2009. It is revealed that off-shore fiscal paradises, such as Bermuda, the Bahamas, and the Cayman Islands provide extremely favorable tax conditions as reflected by high index values. Moreover, certain European countries, such as Luxembourg, Cyprus, the Netherlands, Ireland, and Malta also achieve high index values.

In a second step, the *Tax Attractiveness Index* is subject to further analysis aiming at validating the freshly developed tax measure. Regional clusters in the *Tax Attractiveness Index* as well as in certain individual tax rules can be observed.

Furthermore, it is shown that the index corresponds with the OECD lists of countries and tax regimes perceived as constituting harmful tax competition. However, the evaluations drawn from the index are not totally identical with the OECD. Certain countries have been removed from the OECD list over time although their tax environments have not changed significantly or have even improved as measured by the *Tax Attractiveness Index*. Moreover, by relating the index to the statutory corporate tax rate it is revealed that the latter is not necessarily a suitable proxy for a country's tax environment. Especially in Europe, many high tax countries offer extremely favorable tax conditions as expressed by high index values. A comparison with effective tax rates used in recent empirical studies discloses that they are not perfectly correlated with the *Tax Attractiveness Index*, either. Hence, the index cannot be substituted by existing tax measures, but it represents an entirely new approach to determining a country's tax environment.

Third, the *Tax Attractiveness Index* is employed as a tax measure in an empirical study analyzing the influence of taxation on the location decisions of multinational enterprises. By means of count data regression models, it is shown that the *Tax Attractiveness Index* is significantly positively correlated with the number of German-controlled subsidiaries and hence has an impact on the location decisions of German multinational enterprises. From this, it can be concluded that corporate choices depend on a bundle of tax factors. As main drivers for the results, the withholding taxes that a country imposes as well as its double tax treaty network and the existence of a holding regime can be identified. Since it is revealed that German multinational enterprises place subsidiaries in off-shore tax havens, such as Bermuda and the Bahamas as well as in further countries offering extremely attractive tax environments, such as the

Netherlands, Belgium, Austria, and Switzerland, there is reason to assume that indirect structures by means of holding companies or similar tax planning entities are implemented.

In summary, the *Tax Attractiveness Index* provides a fresh, innovative and transparent approach to measuring a country's tax environment. Qualitative tax factors are transformed into quantitative criteria making it possible to include them into the index. From the *Tax Attractiveness Index*, governments and politicians, on the one hand, can learn about their tax positions compared to other jurisdictions. This knowledge might be important with regard to future tax reforms aiming at enhancing a country's tax conditions. Since this thesis even discloses single tax factors across countries, policy makers get an impression about potential for improvement. However, on the other hand, results from the *Tax Attractiveness Index* might be relevant for committees fighting against harmful tax competition and trying to close down tax havens. The *Tax Attractiveness Index* discloses and summarizes which countries offer extremely favorable tax conditions.

Moreover, the *Tax Attractiveness Index* can be applied by international researchers in future studies. The present thesis grants further analyses and validation of the index proving it to be a credible tax measure. However, the index still does not capture *all* provisions of complex tax systems. Going forward, a further advancement of the index or certain modifications might be necessary in order to develop the *Tax Attractiveness Index* into an even more reliable tax measure. This leaves room for further research.

However, the empirical study conducted in the present thesis applying the *Tax Attractiveness Index* is able to yield additional insights into the influence of taxation on

the location decisions of multinational enterprises. The index proves to be highly correlated with the number of subsidiaries German multinational enterprises place in certain countries. These findings are relevant for policy makers since they can learn that companies take a bundle of tax factors into consideration when deciding where to place their subsidiaries. Moreover, companies and consultants can identify attractive tax locations they might use with regard to future tax planning and they get an insight into the location strategies of other multinational enterprises.

This thesis contributes to current literature by showing that multinationals' location choices depend on various tax factors as captured by the *Tax Attractiveness Index*. Therefore, it is to be wished that the present thesis encourages researchers to employ the index in future studies in order to gain further, valuable knowledge about the influence of taxation on corporate decisions.

Appendix

A Additional Analyses Chapter 2

Table A.I: Tax Factors per Country

This table reports mean values per sample country over years 2005 to 2009 for each of the 16 tax factors that form the *Tax Attractiveness Index*. Each tax factor is measured on an annual basis and collected for a sample of 100 countries. All tax factors are restricted to values between zero and one. In all cases, a value of one indicates the optimum, that is, the most attractive characteristic of a tax factor. For a detailed description of the respective measurement see Table 2-1. *STR* is the statutory tax rate. *DIV* represents taxation of dividends and *CG* taxation of capital gains. *WHTD*, *WHTI*, and *WHTR* indicate withholding taxes on dividends, interest and royalties, respectively. *EU* indicates whether a country is member of the European Union. *LCB* and *LCF* denote loss carry back and loss carry forward opportunities. *GROUP* represents the possibility to file a consolidated tax return. *DTT* represents the double tax treaties concluded. *THIN* indicates thin capitalization rules and *CFC* indicates controlled foreign corporation rules. *AAL* represents anti avoidance legislation. *PIT* denotes the personal income tax rate. *HOLD* indicates the existence of a special holding regime.

| Country (Code) | STR | DIV | CG | WHTD | WHTI | WHTR | EU | LCB |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Algeria (DZA) | 0.3399 | 0.0000 | 0.0000 | 0.5714 | 0.7384 | 0.3418 | 0.0000 | 0.0000 |
| Angola (AGO) | 0.1443 | 0.0000 | 0.0000 | 0.7143 | 0.6076 | 0.7258 | 0.0000 | 0.0000 |
| Argentina (ARG) | 0.1443 | 0.0000 | 0.0000 | 0.0000 | 0.0844 | 0.1361 | 0.0000 | 0.0000 |
| Australia (AUS) | 0.2665 | 1.0000 | 1.0000 | 0.1429 | 0.7384 | 0.1773 | 0.0000 | 0.0000 |
| Austria (AUT) | 0.3888 | 1.0000 | 1.0000 | 0.2857 | 1.0000 | 0.4515 | 1.0000 | 0.0000 |
| Bahamas (BHS) | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 |
| Bahrain (BHR) | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 |
| Bangladesh (BGD) | 0.0347 | 0.0000 | 0.0000 | 0.5429 | 0.6000 | 0.7258 | 0.0000 | 0.0000 |
| Belarus (BLR) | 0.4132 | 0.0000 | 0.0000 | 0.5714 | 0.7362 | 0.5806 | 0.0000 | 0.0000 |
| Belgium (BEL) | 0.1690 | 0.9500 | 1.0000 | 0.2857 | 0.6076 | 0.5886 | 1.0000 | 0.0000 |
| Bermuda (BMU) | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 |
| Bolivia (BOL) | 0.3888 | 1.0000 | 1.0000 | 0.6429 | 0.6730 | 0.6572 | 0.0000 | 0.0000 |
| Botswana (BWA) | 0.3888 | 0.0000 | 0.0000 | 0.5714 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| Brazil (BRA) | 0.1687 | 0.0000 | 0.0000 | 1.0000 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| British Virgin Islands (VGB) | 0.9267 | 0.8000 | 1.0000 | 1.0000 | 1.0000 | 0.9241 | 0.0000 | 0.8000 |
| Bulgaria (BGR) | 0.7066 | 0.6000 | 0.0000 | 0.8229 | 0.6878 | 0.6752 | 0.6000 | 0.0000 |
| Canada (CAN) | 0.1453 | 1.0000 | 0.5000 | 0.2857 | 0.3460 | 0.3144 | 0.0000 | 1.0000 |
| Cayman Islands (CYM) | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 |
| Chile (CHL) | 0.5844 | 0.0000 | 0.0000 | 0.0000 | 0.0844 | 0.1773 | 0.0000 | 1.0000 |
| China (CHN) | 0.2714 | 0.0000 | 0.0000 | 0.7143 | 0.7384 | 0.7258 | 0.0000 | 0.0000 |

| Country (Code) | LCF | GROUP | DTT | THIN | CFC | AAL | PIT | HOLD |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Algeria (DZA) | 0.0000 | 0.5000 | 0.1657 | 1.0000 | 1.0000 | 0.5000 | 0.3220 | 0.0000 |
| Angola (AGO) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 0.5000 | 0.7458 | 0.0000 |
| Argentina (ARG) | 0.0000 | 0.0000 | 0.1522 | 0.0000 | 0.0000 | 0.5000 | 0.4068 | 0.0000 |
| Australia (AUS) | 1.0000 | 0.5000 | 0.3538 | 0.0000 | 0.0000 | 0.0000 | 0.1983 | 0.0000 |
| Austria (AUT) | 1.0000 | 1.0000 | 0.6061 | 0.5000 | 1.0000 | 0.5000 | 0.1525 | 0.0000 |
| Bahamas (BHS) | 1.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Bahrain (BHR) | 1.0000 | 0.0000 | 0.0866 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| Bangladesh (BGD) | 0.5000 | 0.0000 | 0.2000 | 1.0000 | 1.0000 | 0.5000 | 0.5763 | 0.0000 |
| Belarus (BLR) | 0.0000 | 0.0000 | 0.4252 | 1.0000 | 1.0000 | 0.5000 | 0.7966 | 0.0000 |
| Belgium (BEL) | 1.0000 | 0.0000 | 0.7333 | 1.0000 | 1.0000 | 0.5000 | 0.0949 | 1.0000 |
| Bermuda (BMU) | 1.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Bolivia (BOL) | 1.0000 | 0.0000 | 0.0770 | 0.5000 | 1.0000 | 0.5000 | 0.7797 | 0.0000 |
| Botswana (BWA) | 0.0000 | 0.0000 | 0.0682 | 1.0000 | 1.0000 | 1.0000 | 0.5763 | 0.0000 |
| Brazil (BRA) | 1.0000 | 0.0000 | 0.2254 | 1.0000 | 0.0000 | 0.0000 | 0.5339 | 0.0000 |
| British Virgin Islands (VGB) | 1.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9322 | 1.0000 |
| Bulgaria (BGR) | 0.0000 | 0.0000 | 0.5158 | 0.0000 | 1.0000 | 0.5000 | 0.6881 | 0.0000 |
| Canada (CAN) | 0.5000 | 0.0000 | 0.7300 | 0.0000 | 0.0000 | 0.0000 | 0.2135 | 0.0000 |
| Cayman Islands (CYM) | 1.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 0.5000 | 1.0000 | 1.0000 |
| Chile (CHL) | 1.0000 | 0.0000 | 0.1277 | 0.0000 | 1.0000 | 0.0000 | 0.3220 | 1.0000 |
| China (CHN) | 0.0000 | 0.0000 | 0.7282 | 0.6000 | 0.6000 | 0.5000 | 0.2373 | 0.0000 |

| Country (Code) | STR | DIV | CG | WHTD | WHTI | WHTR | EU | LCB |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Colombia (COL) | 0.1687 | 0.0000 | 0.0000 | 0.9200 | 0.0647 | 0.0230 | 0.0000 | 0.0000 |
| Costa Rica (CRI) | 0.2665 | 1.0000 | 1.0000 | 0.5714 | 0.6076 | 0.3144 | 0.0000 | 0.0000 |
| Croatia (HRV) | 0.5110 | 1.0000 | 0.0000 | 1.0000 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| Cyprus (CYP) | 0.7555 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.7258 | 1.0000 | 0.0000 |
| Czech Republic (CZE) | 0.4378 | 1.0000 | 0.4000 | 0.5714 | 0.6076 | 0.4303 | 1.0000 | 0.0000 |
| Denmark (DNK) | 0.3448 | 1.0000 | 1.0000 | 0.2000 | 0.8483 | 0.2067 | 1.0000 | 0.0000 |
| Dominican Republic (DOM) | 0.3692 | 1.0000 | 1.0000 | 0.2629 | 0.4495 | 0.2915 | 0.0000 | 0.0000 |
| Ecuador (ECU) | 0.3888 | 0.4000 | 0.4000 | 1.0000 | 0.7417 | 0.3144 | 0.0000 | 0.0000 |
| Egypt (EGY) | 0.4132 | 0.0000 | 0.0000 | 1.0000 | 0.4161 | 0.3908 | 0.0000 | 0.0000 |
| El Salvador (SLV) | 0.3888 | 1.0000 | 1.0000 | 1.0000 | 0.5273 | 0.4515 | 0.0000 | 0.0000 |
| Estonia (EST) | 0.4572 | 0.8000 | 0.0000 | 1.0000 | 1.0000 | 0.6180 | 1.0000 | 1.0000 |
| Finland (FIN) | 0.3643 | 1.0000 | 1.0000 | 0.2000 | 1.0000 | 0.2321 | 1.0000 | 0.0000 |
| France (FRA) | 0.1557 | 0.9500 | 0.8080 | 0.2857 | 0.5608 | 0.0859 | 1.0000 | 1.0000 |
| Germany (DEU) | 0.1412 | 0.9500 | 0.9500 | 0.3971 | 1.0000 | 0.4825 | 1.0000 | 1.0000 |
| Great Britain (GBR) | 0.2861 | 0.0000 | 1.0000 | 1.0000 | 0.4768 | 0.4198 | 1.0000 | 1.0000 |
| Greece (GRC) | 0.3350 | 0.0000 | 0.0000 | 0.9429 | 0.2752 | 0.4515 | 1.0000 | 0.0000 |
| Guatemala (GTM) | 0.2421 | 1.0000 | 1.0000 | 1.0000 | 0.7384 | 0.1498 | 0.0000 | 0.0000 |
| Guernsey (GGY) | 0.7065 | 0.4000 | 1.0000 | 0.6571 | 0.6834 | 0.6834 | 0.0000 | 0.0000 |
| Hong Kong (HKG) | 0.5772 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.8578 | 0.0000 | 0.0000 |
| Hungary (HUN) | 0.5019 | 1.0000 | 0.6000 | 0.8857 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| Iceland (ISL) | 0.5892 | 1.0000 | 0.4000 | 0.6000 | 1.0000 | 0.5411 | 0.0000 | 0.0000 |
| India (IND) | 0.1579 | 0.0000 | 0.0000 | 1.0000 | 0.4768 | 0.4515 | 0.0000 | 0.0000 |
| Indonesia (IDN) | 0.2766 | 0.0000 | 0.0000 | 0.4286 | 0.4768 | 0.4515 | 0.0000 | 0.0000 |
| Ireland (IRL) | 0.6944 | 0.0000 | 1.0000 | 0.4286 | 0.4768 | 0.4515 | 1.0000 | 1.0000 |
| Israel (ISR) | 0.2813 | 0.0000 | 0.0000 | 0.2857 | 0.3460 | 0.3144 | 0.0000 | 0.0000 |
| Italy (ITA) | 0.1464 | 0.9500 | 0.9300 | 0.2286 | 0.3670 | 0.3829 | 1.0000 | 0.0000 |
| Japan (JPN) | 0.0004 | 0.0000 | 0.0000 | 0.4286 | 0.4768 | 0.4515 | 0.0000 | 1.0000 |

| Country (Code) | LCF | GROUP | DTT | THIN | CFC | AAL | PIT | HOLD |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Colombia (COL) | 0.8000 | 0.0000 | 0.0308 | 1.0000 | 1.0000 | 0.5000 | 0.4000 | 0.0000 |
| Costa Rica (CRI) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 0.5000 | 0.7458 | 0.0000 |
| Croatia (HRV) | 0.0000 | 0.0000 | 0.3705 | 0.0000 | 1.0000 | 0.5000 | 0.2373 | 0.0000 |
| Cyprus (CYP) | 1.0000 | 0.5000 | 0.3641 | 1.0000 | 1.0000 | 0.5000 | 0.4915 | 0.0000 |
| Czech Republic (CZE) | 0.0000 | 0.0000 | 0.6187 | 0.0000 | 0.0000 | 0.5000 | 0.5729 | 0.0000 |
| Denmark (DNK) | 1.0000 | 1.0000 | 0.6360 | 0.0000 | 0.0000 | 0.5000 | 0.0000 | 0.0000 |
| Dominican Republic (DOM) | 0.0000 | 0.0000 | 0.0086 | 1.0000 | 1.0000 | 0.5000 | 0.5763 | 0.0000 |
| Ecuador (ECU) | 0.0000 | 0.0000 | 0.1144 | 0.6000 | 1.0000 | 0.5000 | 0.5085 | 0.0000 |
| Egypt (EGY) | 0.0000 | 0.0000 | 0.4407 | 0.0000 | 0.8000 | 0.5000 | 0.6136 | 0.0000 |
| El Salvador (SLV) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 0.5000 | 0.5763 | 0.0000 |
| Estonia (EST) | 1.0000 | 0.0000 | 0.3056 | 1.0000 | 1.0000 | 0.0000 | 0.6237 | 0.0000 |
| Finland (FIN) | 0.5000 | 0.5000 | 0.5708 | 1.0000 | 0.0000 | 0.5000 | 0.1447 | 0.0000 |
| France (FRA) | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 0.0000 | 0.5000 | 0.1665 | 0.0000 |
| Germany (DEU) | 1.0000 | 0.5000 | 0.7541 | 0.0000 | 0.0000 | 0.0000 | 0.2167 | 0.0000 |
| Great Britain (GBR) | 1.0000 | 0.5000 | 0.9557 | 0.5000 | 0.0000 | 0.0000 | 0.3220 | 1.0000 |
| Greece (GRC) | 0.0000 | 0.0000 | 0.3637 | 1.0000 | 1.0000 | 0.5000 | 0.3220 | 0.0000 |
| Guatemala (GTM) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 0.4746 | 0.0000 |
| Guernsey (GGY) | 1.0000 | 0.2000 | 0.0171 | 1.0000 | 1.0000 | 0.5000 | 0.6610 | 1.0000 |
| Hong Kong (HKG) | 1.0000 | 0.0000 | 0.0221 | 0.0000 | 1.0000 | 0.0000 | 0.7356 | 0.0000 |
| Hungary (HUN) | 1.0000 | 0.0000 | 0.5366 | 0.0000 | 0.0000 | 0.5000 | 0.3424 | 0.0000 |
| Iceland (ISL) | 0.5000 | 0.5000 | 0.2527 | 1.0000 | 1.0000 | 0.5000 | 0.2956 | 0.0000 |
| India (IND) | 0.5000 | 0.0000 | 0.6114 | 1.0000 | 1.0000 | 0.5000 | 0.4915 | 0.0000 |
| Indonesia (IDN) | 0.0000 | 0.0000 | 0.4718 | 0.5000 | 0.0000 | 0.5000 | 0.4237 | 0.0000 |
| Ireland (IRL) | 1.0000 | 0.5000 | 0.3812 | 1.0000 | 1.0000 | 0.5000 | 0.2780 | 1.0000 |
| Israel (ISR) | 1.0000 | 0.0000 | 0.3568 | 1.0000 | 0.0000 | 0.5000 | 0.1898 | 0.8000 |
| Italy (ITA) | 0.0000 | 1.0000 | 0.6717 | 0.0000 | 0.0000 | 0.0000 | 0.2517 | 0.0000 |
| Japan (JPN) | 0.5000 | 0.5000 | 0.3863 | 0.0000 | 0.0000 | 0.5000 | 0.1525 | 0.0000 |

| Country (Code) | STR | DIV | CG | WHTD | WHTI | WHTR | EU | LCB |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Jersey (JEY) | 0.6120 | 0.8000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 0.8000 |
| Kazakhstan (KAZ) | 0.3170 | 0.0000 | 0.0000 | 0.5714 | 0.6076 | 0.4809 | 0.0000 | 0.0000 |
| Kenya (KEN) | 0.2665 | 1.0000 | 1.0000 | 0.7143 | 0.6076 | 0.4515 | 0.0000 | 0.0000 |
| Korea (South) (KOR) | 0.3443 | 0.0000 | 0.0000 | 0.3429 | 0.4007 | 0.3307 | 0.0000 | 0.0000 |
| Latvia (LVA) | 0.6333 | 1.0000 | 0.0000 | 0.7143 | 0.7384 | 0.5886 | 1.0000 | 0.0000 |
| Lebanon (LBN) | 0.6333 | 0.0000 | 0.0000 | 0.7143 | 0.7384 | 0.7943 | 0.0000 | 0.0000 |
| Liechtenstein (LIE) | 0.5110 | 0.9500 | 0.0000 | 0.8857 | 0.8954 | 1.0000 | 0.0000 | 0.0000 |
| Lithuania (LTU) | 0.6080 | 1.0000 | 0.6000 | 0.5429 | 0.7384 | 0.7258 | 1.0000 | 0.0000 |
| Luxembourg (LUX) | 0.2771 | 1.0000 | 1.0000 | 0.5143 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| Macedonia (MKD) | 0.6968 | 0.0000 | 0.0000 | 0.7314 | 0.7890 | 0.7396 | 0.0000 | 0.2000 |
| Malaysia (MYS) | 0.3449 | 1.0000 | 1.0000 | 1.0000 | 0.6076 | 0.7258 | 0.0000 | 0.0000 |
| Malta (MLT) | 0.1443 | 0.6000 | 0.6000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| Mauritius (MUS) | 0.4987 | 0.0000 | 1.0000 | 1.0000 | 0.6614 | 0.6752 | 0.0000 | 0.0000 |
| Mexico (MEX) | 0.3008 | 0.0000 | 0.0000 | 1.0000 | 0.7384 | 0.3144 | 0.0000 | 0.0000 |
| Montenegro (MNE) | 0.7800 | 0.8000 | 0.0000 | 0.6057 | 0.8692 | 0.6239 | 0.0000 | 0.0000 |
| Morocco (MAR) | 0.1932 | 0.4000 | 0.0000 | 0.7143 | 0.5801 | 0.4515 | 0.0000 | 0.0000 |
| Namibia (NAM) | 0.1443 | 1.0000 | 1.0000 | 0.7143 | 1.0000 | 0.7120 | 0.0000 | 0.0000 |
| Netherlands (NLD) | 0.3272 | 1.0000 | 1.0000 | 0.4571 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Netherlands Antilles (ANT) | 0.1565 | 0.9600 | 0.9600 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 0.0000 |
| New Zealand (NZL) | 0.2225 | 1.0000 | 1.0000 | 0.1429 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| Nicaragua (NIC) | 0.2665 | 1.0000 | 1.0000 | 1.0000 | 0.4114 | 0.4241 | 0.0000 | 0.0000 |
| Nigeria (NGA) | 0.2665 | 0.0000 | 1.0000 | 0.7143 | 0.7384 | 0.7258 | 0.0000 | 0.0000 |
| Norway (NOR) | 0.3154 | 0.9940 | 0.9940 | 0.2857 | 1.0000 | 1.0000 | 0.0000 | 0.4000 |
| Pakistan (PAK) | 0.1443 | 0.0000 | 0.0000 | 0.7143 | 0.4218 | 0.5886 | 0.0000 | 0.0000 |
| Panama (PAN) | 0.2665 | 1.0000 | 1.0000 | 0.7143 | 0.6531 | 0.5128 | 0.0000 | 0.0000 |
| Paraguay (PRY) | 0.7066 | 1.0000 | 1.0000 | 0.6000 | 0.5949 | 0.5760 | 0.0000 | 0.0000 |
| Peru (PER) | 0.2665 | 0.0000 | 0.0000 | 0.8829 | 0.2152 | 0.1773 | 0.0000 | 0.0000 |

| Country (Code) | LCF | GROUP | DTT | THIN | CFC | AAL | PIT | HOLD |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Jersey (JEY) | 1.0000 | 0.1000 | 0.0171 | 1.0000 | 1.0000 | 0.5000 | 0.6610 | 1.0000 |
| Kazakhstan (KAZ) | 0.1000 | 0.0000 | 0.3127 | 1.0000 | 1.0000 | 0.5000 | 0.7627 | 0.0000 |
| Kenya (KEN) | 1.0000 | 0.0000 | 0.0684 | 0.0000 | 1.0000 | 0.5000 | 0.4915 | 0.0000 |
| Korea (South) (KOR) | 0.1000 | 0.0000 | 0.5416 | 0.0000 | 0.0000 | 0.0000 | 0.3475 | 0.0000 |
| Latvia (LVA) | 0.2000 | 0.5000 | 0.3532 | 0.0000 | 1.0000 | 1.0000 | 0.5831 | 0.0000 |
| Lebanon (LBN) | 0.0000 | 0.0000 | 0.2247 | 1.0000 | 1.0000 | 0.5000 | 0.6610 | 1.0000 |
| Liechtenstein (LIE) | 0.0000 | 0.0000 | 0.0086 | 1.0000 | 1.0000 | 0.5000 | 0.7062 | 1.0000 |
| Lithuania (LTU) | 0.4000 | 0.0000 | 0.3655 | 0.0000 | 0.0000 | 0.0000 | 0.5525 | 0.0000 |
| Luxembourg (LUX) | 1.0000 | 0.5000 | 0.4186 | 1.0000 | 1.0000 | 0.5000 | 0.3398 | 1.0000 |
| Macedonia (MKD) | 0.2000 | 0.4000 | 0.2832 | 0.8000 | 1.0000 | 1.0000 | 0.6407 | 0.0000 |
| Malaysia (MYS) | 1.0000 | 0.4000 | 0.5104 | 0.9000 | 1.0000 | 1.0000 | 0.5288 | 1.0000 |
| Malta (MLT) | 1.0000 | 0.5000 | 0.3707 | 1.0000 | 1.0000 | 0.0000 | 0.4068 | 1.0000 |
| Mauritius (MUS) | 0.4000 | 0.0000 | 0.2787 | 1.0000 | 1.0000 | 0.5000 | 0.6186 | 1.0000 |
| Mexico (MEX) | 0.5000 | 0.5000 | 0.2697 | 0.0000 | 0.0000 | 0.5000 | 0.5153 | 0.0000 |
| Montenegro (MNE) | 0.0000 | 0.5000 | 0.2682 | 0.6000 | 1.0000 | 1.0000 | 0.7525 | 0.0000 |
| Morocco (MAR) | 0.0000 | 0.0000 | 0.2699 | 1.0000 | 1.0000 | 1.0000 | 0.3288 | 1.0000 |
| Namibia (NAM) | 1.0000 | 0.0000 | 0.0836 | 0.5000 | 1.0000 | 0.5000 | 0.3932 | 0.0000 |
| Netherlands (NLD) | 0.7000 | 0.5000 | 0.7179 | 0.0000 | 1.0000 | 0.5000 | 0.1186 | 1.0000 |
| Netherlands Antilles (ANT) | 0.5000 | 0.5000 | 0.0257 | 1.0000 | 1.0000 | 1.0000 | 0.1346 | 1.0000 |
| New Zealand (NZL) | 1.0000 | 0.5000 | 0.2715 | 0.0000 | 0.0000 | 0.0000 | 0.3424 | 0.0000 |
| Nicaragua (NIC) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 0.4915 | 0.0000 |
| Nigeria (NGA) | 0.4000 | 0.0000 | 0.0751 | 1.0000 | 1.0000 | 0.5000 | 0.5763 | 0.0000 |
| Norway (NOR) | 0.9000 | 0.5000 | 0.6890 | 1.0000 | 0.0000 | 0.5000 | 0.3102 | 0.0000 |
| Pakistan (PAK) | 0.5000 | 0.2000 | 0.4035 | 0.0000 | 1.0000 | 0.5000 | 0.5932 | 0.0000 |
| Panama (PAN) | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 0.5424 | 0.0000 |
| Paraguay (PRY) | 0.0000 | 0.0000 | 0.0017 | 1.0000 | 1.0000 | 1.0000 | 0.8983 | 0.0000 |
| Peru (PER) | 0.0000 | 0.0000 | 0.0497 | 0.0000 | 1.0000 | 0.0000 | 0.4915 | 0.0000 |

| Country (Code) | STR | DIV | CG | WHTD | WHTI | WHTR | EU | LCB |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Philippines (PHL) | 0.1842 | 0.0000 | 0.0000 | 0.0629 | 0.4768 | 0.0999 | 0.0000 | 0.0000 |
| Poland (POL) | 0.5355 | 0.6000 | 0.0000 | 0.4571 | 0.4768 | 0.4515 | 1.0000 | 0.0000 |
| Portugal (PRT) | 0.3643 | 1.0000 | 0.0000 | 0.4000 | 0.4768 | 0.5886 | 1.0000 | 0.0000 |
| Puerto Rico (PRI) | 0.0465 | 0.0000 | 0.0000 | 0.7143 | 0.2413 | 0.2047 | 0.0000 | 0.0000 |
| Romania (ROU) | 0.6088 | 0.6000 | 0.0000 | 0.5486 | 0.5865 | 0.5663 | 0.6000 | 0.0000 |
| Russia (RUS) | 0.4334 | 0.4000 | 0.0000 | 0.5714 | 0.4768 | 0.4515 | 0.0000 | 0.0000 |
| Saudi Arabia (SAU) | 0.4621 | 0.0000 | 0.0000 | 0.8571 | 0.8692 | 0.5886 | 0.0000 | 0.0000 |
| Serbia (SRB) | 0.7555 | 0.0000 | 0.0000 | 0.4286 | 0.4768 | 0.4515 | 0.0000 | 0.0000 |
| Singapore (SGP) | 0.5306 | 1.0000 | 1.0000 | 1.0000 | 0.6076 | 0.7258 | 0.0000 | 0.8000 |
| Slovak Republic (SVK) | 0.5355 | 1.0000 | 0.0000 | 1.0000 | 0.5029 | 0.4789 | 1.0000 | 0.0000 |
| Slovenia (SVN) | 0.4329 | 0.9800 | 0.5000 | 0.4571 | 0.5064 | 0.4875 | 1.0000 | 0.0000 |
| South Africa (ZAF) | 0.2911 | 1.0000 | 0.5000 | 1.0000 | 1.0000 | 0.6709 | 0.0000 | 0.0000 |
| Spain (ESP) | 0.2054 | 1.0000 | 1.0000 | 0.5200 | 0.5594 | 0.3317 | 1.0000 | 0.0000 |
| Sweden (SWE) | 0.3240 | 1.0000 | 1.0000 | 0.1429 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| Switzerland (CHE) | 0.4804 | 0.9500 | 1.0000 | 0.0000 | 0.0844 | 1.0000 | 1.0000 | 0.0000 |
| Taiwan (TWN) | 0.3888 | 0.0000 | 0.0000 | 0.2857 | 0.4768 | 0.4515 | 0.0000 | 0.0000 |
| Thailand (THA) | 0.2665 | 0.6000 | 0.0000 | 0.7143 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| Tunisia (TUN) | 0.2176 | 1.0000 | 0.0000 | 1.0000 | 0.4768 | 0.5886 | 0.0000 | 0.0000 |
| Turkey (TUR) | 0.4132 | 1.0000 | 0.6000 | 0.6286 | 0.5924 | 0.4313 | 0.0000 | 0.0000 |
| Ukraine (UKR) | 0.3888 | 0.0000 | 0.0000 | 0.5714 | 0.6076 | 0.5886 | 0.0000 | 0.0000 |
| United Arab Emirates (ARE) | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 | 1.0000 |
| United States (USA) | 0.0274 | 0.0000 | 0.0000 | 0.1429 | 0.2152 | 0.1773 | 0.0000 | 1.0000 |
| Uruguay (URY) | 0.3154 | 1.0000 | 1.0000 | 0.5371 | 0.8074 | 0.4889 | 0.0000 | 0.0000 |
| Venezuela (VEN) | 0.1687 | 0.0000 | 0.0000 | 0.0286 | 0.1105 | 0.0676 | 0.0000 | 0.0000 |
| Vietnam (VNM) | 0.3306 | 0.0000 | 0.0000 | 1.0000 | 0.7384 | 0.7258 | 0.0000 | 0.0000 |
| Zimbabwe (ZWE) | 0.2665 | 0.0000 | 0.0000 | 0.4286 | 0.7384 | 0.4515 | 0.0000 | 0.0000 |

| Country (Code) | LCF | GROUP | DTT | THIN | CFC | AAL | PIT | HOLD |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Philippines (PHL) | 0.0000 | 0.0000 | 0.3026 | 0.5000 | 1.0000 | 0.5000 | 0.4576 | 0.0000 |
| Poland (POL) | 0.0000 | 0.5000 | 0.6562 | 0.0000 | 1.0000 | 0.5000 | 0.3492 | 0.0000 |
| Portugal (PRT) | 0.5000 | 0.5000 | 0.4066 | 0.5000 | 0.0000 | 0.0000 | 0.2949 | 1.0000 |
| Puerto Rico (PRI) | 0.5000 | 0.0000 | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 0.4407 | 0.0000 |
| Romania (ROU) | 0.1000 | 0.0000 | 0.6650 | 0.0000 | 1.0000 | 0.5000 | 0.7288 | 0.0000 |
| Russia (RUS) | 0.5000 | 0.0000 | 0.5829 | 0.0000 | 1.0000 | 0.5000 | 0.7797 | 0.0000 |
| Saudi Arabia (SAU) | 1.0000 | 0.0000 | 0.0254 | 1.0000 | 1.0000 | 0.5000 | 1.0000 | 0.0000 |
| Serbia (SRB) | 0.5000 | 0.5000 | 0.2749 | 0.0000 | 1.0000 | 0.7000 | 0.7797 | 0.0000 |
| Singapore (SGP) | 1.0000 | 0.5000 | 0.4558 | 1.0000 | 1.0000 | 0.0000 | 0.6576 | 0.6000 |
| Slovak Republic (SVK) | 0.0000 | 0.0000 | 0.4751 | 1.0000 | 1.0000 | 1.0000 | 0.6780 | 0.0000 |
| Slovenia (SVN) | 0.7000 | 0.2000 | 0.3396 | 0.0000 | 1.0000 | 0.5000 | 0.2441 | 0.0000 |
| South Africa (ZAF) | 1.0000 | 0.5000 | 0.5074 | 0.0000 | 0.0000 | 0.5000 | 0.3220 | 0.0000 |
| Spain (ESP) | 0.5000 | 0.5000 | 0.5790 | 0.0000 | 0.0000 | 0.5000 | 0.2576 | 1.0000 |
| Sweden (SWE) | 1.0000 | 0.5000 | 0.6874 | 1.0000 | 0.0000 | 0.5000 | 0.0407 | 0.0000 |
| Switzerland (CHE) | 0.5000 | 0.0000 | 0.7367 | 1.0000 | 1.0000 | 0.5000 | 0.3186 | 1.0000 |
| Taiwan (TWN) | 0.0000 | 0.5000 | 0.1263 | 1.0000 | 1.0000 | 0.5000 | 0.3220 | 0.0000 |
| Thailand (THA) | 0.0000 | 0.0000 | 0.4305 | 1.0000 | 1.0000 | 0.5000 | 0.3729 | 0.0000 |
| Tunisia (TUN) | 0.0000 | 0.3000 | 0.3059 | 0.5000 | 1.0000 | 0.5000 | 0.4068 | 0.0000 |
| Turkey (TUR) | 0.0000 | 0.0000 | 0.5380 | 0.2000 | 0.4000 | 0.2000 | 0.3966 | 1.0000 |
| Ukraine (UKR) | 1.0000 | 0.0000 | 0.5195 | 1.0000 | 1.0000 | 0.7000 | 0.7593 | 0.0000 |
| United Arab Emirates (ARE) | 1.0000 | 0.0000 | 0.2914 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.0000 |
| United States (USA) | 0.5000 | 0.5000 | 0.5454 | 0.0000 | 0.0000 | 0.5000 | 0.2828 | 0.0000 |
| Uruguay (URY) | 0.0000 | 0.0000 | 0.0171 | 1.0000 | 1.0000 | 1.0000 | 0.7458 | 1.0000 |
| Venezuela (VEN) | 0.0000 | 0.0000 | 0.1827 | 0.6000 | 0.0000 | 0.5000 | 0.4237 | 0.0000 |
| Vietnam (VNM) | 0.0000 | 0.0000 | 0.3401 | 1.0000 | 1.0000 | 1.0000 | 0.3390 | 0.0000 |
| Zimbabwe (ZWE) | 0.5000 | 0.0000 | 0.1110 | 0.0000 | 1.0000 | 0.5000 | 0.2841 | 0.0000 |

Table A.II: Correlation between Components of the Tax Attractiveness Index

This table reports correlation coefficients for 16 tax factors that form the *Tax Attractiveness Index*. Each tax factor is measured on an annual basis and collected for a sample of 100 countries over years 2005 to 2009. In all cases, a value of one indicates the optimum, that is, the most attractive characteristic of a tax factor. For a detailed description of the respective measurement see Table 2-1. *STR* is the statutory tax rate. *DIV* represents taxation of dividends and *CG* taxation of capital gains. *WHTD*, *WHTI*, and *WHTR* indicate withholding taxes on dividends, interest and royalties, respectively. *EU* indicates whether a country is member of the European Union. *LCB* and *LCF* denote loss carry back and loss carry forward opportunities. *GROUP* represents the possibility to file a consolidated tax return. *DTT* represents the double tax treaties concluded. *THIN* indicates thin capitalization rules and *CFC* indicates controlled foreign corporation rules. *AAL* represents anti avoidance legislation. *PIT* denotes the personal income tax rate. *HOLD* indicates the existence of a special holding regime. *TAX* is the self-constructed *Tax Attractiveness Index*. Insignificant correlations ($p \geq 0.1$) are reported in italics.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
|------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|--------------|-------------|--------------|------|------|-------------|-------------|------|------|
| (1) STR | 1 | | | | | | | | | | | | | | | | |
| (2) DIV | 0.25 | 1 | | | | | | | | | | | | | | | |
| (3) CG | 0.19 | 0.62 | 1 | | | | | | | | | | | | | | |
| (4) WHTD | 0.30 | <i>0.07</i> | <i>0.03</i> | 1 | | | | | | | | | | | | | |
| (5) WHTI | 0.38 | 0.41 | 0.37 | 0.33 | 1 | | | | | | | | | | | | |
| (6) WHTR | 0.47 | 0.31 | 0.29 | 0.40 | 0.61 | 1 | | | | | | | | | | | |
| (7) EU | <i>0.01</i> | 0.33 | 0.20 | -0.20 | 0.11 | <i>0.06</i> | 1 | | | | | | | | | | |
| (8) LCB | 0.28 | 0.11 | 0.24 | <i>0.04</i> | 0.14 | 0.18 | <i>0.06</i> | 1 | | | | | | | | | |
| (9) LCF | 0.16 | 0.23 | 0.45 | <i>0.03</i> | 0.35 | 0.31 | 0.19 | 0.43 | 1 | | | | | | | | |
| (10) GROUP | -0.11 | 0.21 | 0.22 | -0.28 | 0.19 | <i>-0.07</i> | 0.43 | 0.10 | 0.25 | 1 | | | | | | | |
| (11) DTT | -0.21 | 0.07 | <i>-0.02</i> | -0.32 | <i>-0.07</i> | <i>-0.07</i> | 0.58 | 0.12 | 0.12 | 0.44 | 1 | | | | | | |
| (12) THIN | 0.15 | <i>-0.06</i> | 0.14 | 0.29 | 0.20 | 0.31 | -0.19 | <i>-0.03</i> | <i>0.00</i> | -0.24 | -0.38 | 1 | | | | | |
| (13) CFC | 0.32 | <i>-0.04</i> | <i>-0.04</i> | 0.41 | 0.10 | 0.27 | -0.23 | -0.09 | -0.13 | -0.34 | -0.48 | 0.45 | 1 | | | | |
| (14) AAL | 0.28 | <i>0.05</i> | <i>0.03</i> | 0.26 | 0.15 | 0.18 | -0.23 | <i>-0.07</i> | -0.20 | -0.16 | -0.33 | 0.39 | 0.43 | 1 | | | |
| (15) PIT | 0.60 | <i>-0.02</i> | <i>-0.01</i> | 0.45 | 0.19 | 0.32 | -0.39 | 0.11 | <i>-0.03</i> | -0.48 | -0.51 | 0.29 | 0.46 | 0.33 | 1 | | |
| (16) HOLD | 0.23 | 0.13 | 0.31 | 0.09 | 0.11 | 0.36 | 0.11 | 0.28 | 0.26 | <i>0.01</i> | <i>-0.03</i> | 0.26 | 0.13 | <i>0.03</i> | <i>0.03</i> | 1 | |
| (17) TAX | 0.56 | 0.58 | 0.66 | 0.38 | 0.64 | 0.68 | 0.30 | 0.43 | 0.53 | 0.17 | <i>-0.02</i> | 0.40 | 0.32 | 0.28 | 0.28 | 0.53 | 1 |

B Additional Analyses Chapter 3

Table B.1: Tax Attractiveness Index – Differences among Sample Countries

This table reports differences in the *Tax Attractiveness Index* for three different sample breakdowns. The *Tax Attractiveness Index* is an equally-weighted sum of 16 different tax factors determining a country's tax attractiveness. For a detailed description of the index construction see Table 2-1. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country i offers in year t . Panel A reports mean value differences for the *Tax Attractiveness Index* between EU and non-EU countries. EU countries are defined as those belonging to the EU 2009. Values of the column are always subtracted from row values. Above the diagonal, we provide p-values resulting from t-tests in parentheses. Below the diagonal, p-values resulting from Wilcoxon rank-sum tests are reported in parentheses. Panel B presents mean value differences for the *Tax Attractiveness Index* between OECD and non-OECD countries. Panel C reports mean value differences for the *Tax Attractiveness Index* between countries offering a special holding regime and those who do not. Countries offering a special holding regime are defined as those who offer a holding regime in the year 2009. Since the index shows little within-country variation over time, we use mean values per country reducing the number of observations to 100, respectively.

| Panel A: EU vs. Non-EU | | |
|---|--------------------------------|------------------------------------|
| | EU (N=28; Mean=0.5320) | Non-EU (N=72; Mean=0.4314) |
| EU (N=28; Mean=0.5320) | | 0.1006 (0.0032) |
| Non-EU (N=72; Mean=0.4314) | -0.1006 (0.0004) | |
| Panel B: OECD vs. Non-OECD | | |
| | OECD (N=30; Mean=0.4708) | Non-OECD (N=70; Mean=0.4548) |
| OECD (N=30; Mean=0.4708) | | 0.0160 (0.6408) |
| Non-OECD (N=70; Mean=0.4548) | -0.0160 (0.3912) | |
| Panel C: Holding vs. Non-Holding | | |
| | Holding (N=26; Mean=0.5989) | Non-Holding (N=74; Mean=0.4107) |
| Holding (N=26; Mean=0.5989) | | 0.1882 (0.0000) |
| Non-Holding (N=74; Mean=0.4107) | -0.1882 (0.0000) | |

Table B.II: Tax Attractiveness Index and Statutory Tax Rate – Correlation Coefficients

This table reports correlations between the *Tax Attractiveness Index* and the statutory tax rate (*STR*). For the purpose of this analysis, we exclude the statutory tax rate from the index. Therefore, the *Tax Attractiveness Index* is defined as an equally-weighted sum of 15 different tax factors determining a country's tax attractiveness. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. Since both variables show little within-country variation over time, we use mean values per country over the years 2005 to 2009 for the *Tax Attractiveness Index* as well as the statutory tax rate. In columns (1), results from Pearson correlation coefficients are reported. In columns (2), results from Spearman rank correlation coefficients are reported. Panel A shows results for the full sample. Panel B presents results for EU versus non-EU countries. EU countries are defined as those belonging to the EU 2009. Panel C reports results for OECD versus non-OECD countries. P-values are shown in parentheses.

| Panel A: Full Sample | | |
|---|---------------------|---------------------|
| | (1) | (2) |
| Full Sample | -0.5034 (0.0000) | -0.4031 (0.0000) |
| Full Sample (STR > 15%) | -0.2433 (0.0240) | -0.2465 (0.0221) |
| Panel B: EU vs. Non-EU Countries | | |
| | (1) | (2) |
| EU | 0.1687 (0.3908) | 0.1878 (0.3386) |
| EU (STR > 15%) | 0.2778 (0.1788) | 0.3228 (0.1155) |
| Non-EU | -0.6573 (0.0000) | -0.5271 (0.0000) |
| Non-EU (STR > 15%) | -0.3802 (0.0025) | -0.3494 (0.0058) |
| Panel C: OECD vs. Non-OECD Countries | | |
| | (1) | (2) |
| OECD | -0.2952 (0.1133) | -0.2432 (0.1953) |
| OECD (STR > 15%) | -0.2186 (0.2545) | -0.1784 (0.3546) |
| Non-OECD | -0.5966 (0.0000) | -0.4781 (0.0000) |
| Non-OECD (STR > 15%) | -0.2864 (0.0308) | -0.2659 (0.0456) |

Table B.III: Tax Attractiveness Index and Statutory Tax Rate – Regression Outputs

This table reports results from OLS regressions for the relation between the *Tax Attractiveness Index* and the statutory tax rate. The dependent variable is the *Tax Attractiveness Index*, here defined as an equally-weighted sum of 15 different tax factors determining a country's tax attractiveness. For the purpose of this analysis, we exclude the statutory tax rate from the index. The *Tax Attractiveness Index* is measured on an annual basis and it is constructed for a sample of 100 countries over years 2005 to 2009. The index is restricted to values between zero and one. The closer the *Tax Attractiveness Index* is to one, the more attractive is the tax environment country *i* offers in year *t*. The independent variable is the statutory tax rate country *i* imposes in year *t*. Panel A reports regression results for the full sample. Panel B presents regression results for EU versus non-EU countries. Panel C reports regression results for OECD versus non-OECD countries. Standard errors (shown in parentheses) allow for heteroskedasticity and are clustered by country. ***, **, * indicate statistical significance at 1%, 5%, and 10% level, respectively.

| Panel A: Full Sample | | | | |
|---|------------------------|-----------------------|--------------|-----------|
| | STR | Constant | Observations | R-squared |
| Full Sample | -0.8025*** (0.1296) | 0.6621*** (0.0328) | 499 | 0.2424 |
| Full Sample (STR > 15%) | -0.4684** (0.1935) | 0.5664*** (0.0514) | 437 | 0.0463 |
| Panel B: EU vs. Non-EU Countries | | | | |
| | STR | Constant | Observations | R-squared |
| EU | 0.1343 (0.3014) | 0.5142*** (0.0775) | 136 | 0.0079 |
| EU (STR > 15%) | 0.5553* (0.2913) | 0.3933*** (0.0715) | 123 | 0.1003 |
| Non-EU | -0.9758*** (0.1252) | 0.6741*** (0.0336) | 363 | 0.3963 |
| Non-EU (STR > 15%) | -0.6721*** (0.2095) | 0.5871*** (0.0604) | 314 | 0.1075 |
| Panel C: OECD vs. Non-OECD Countries | | | | |
| | STR | Constant | Observations | R-squared |
| OECD | -0.6105** (0.2892) | 0.6502*** (0.0791) | 150 | 0.0783 |
| OECD (STR > 15%) | -0.4779 (0.3232) | 0.6095*** (0.0897) | 145 | 0.0418 |
| Non-OECD | -0.9065*** (0.1452) | 0.6686*** (0.0351) | 349 | 0.3407 |
| Non-OECD (STR > 15%) | -0.5197** (0.2456) | 0.5602*** (0.0643) | 292 | 0.0635 |

C Variable Definitions Chapter 4

| | |
|--------------------------|--|
| Tax Attractiveness Index | Index covering 18 different tax factors. The index represents host country <i>i</i> 's tax attractiveness and is constrained to values between zero and one. The more the index approximates one, the more attractive the tax environment that host country <i>i</i> offers. The index is measured on an annual basis (2005-2009). Data sources: <i>The Global Corporate Tax Handbook</i> and the <i>European Tax Handbook</i> published by the International Bureau of Fiscal Documentation (IBFD), PricewaterhouseCoopers' <i>Corporate Taxes – Worldwide Summaries</i> and <i>Individual Taxes – Worldwide Summaries</i> , Ernst & Young's <i>Worldwide Corporate Tax Guide</i> , Deloitte's <i>Taxation and Investment Guides</i> , KPMG's <i>Corporate Tax Rate Survey</i> and <i>Individual Income Tax Rate Survey</i> , and the OECD tax database. |
| GDP | Logarithm of host country <i>i</i> 's gross domestic product measured in constant U.S. dollars based on the year 2000. <i>GDP</i> is measured on an annual basis. Data sources: World Development Indicators of the World Bank. For Taiwan, we source data from the National Statistics of China (Taiwan) (http://eng.stat.gov.tw/) and the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. Taiwan (http://eng.dgbas.gov.tw/). For the Netherlands Antilles, we source data from the Central Bureau of Statistics Curaçao (http://www.cbs.cw/) and Statistics Netherlands (http://www.cbs.nl/). For the Cayman Islands, we source data from the Economics and Statistics Office, Government of the Cayman Islands (http://www.eso.ky/). For Guernsey, we source data from the States of Guernsey (http://www.gov.gg/). |
| Similarity | An index reflecting the difference between Germany's gross domestic product per capita and the gross domestic product per capita of host country <i>i</i> . The index is defined as one minus the ratio of the absolute value of host country <i>i</i> 's gross domestic product per capita minus Germany's gross domestic product per capita to the higher of both gross domestic products per capita. Gross domestic product per capita is measured in constant U.S. dollars based on the year 2000, respectively. The index uses values between one and zero; a higher score indicates that countries are more similar. <i>Similarity</i> is measured on an annual basis. Data source: World |

Development Indicators of the World Bank. For Taiwan, we source data from the National Statistics of China (Taiwan) (<http://eng.stat.gov.tw/>) and the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. Taiwan (<http://eng.dgbas.gov.tw/>). For the Netherlands Antilles, we source data from the Central Bureau of Statistics Curaçao (<http://www.cbs.cw/>) and Statistics Netherlands (<http://www.cbs.nl/>). For the Cayman Islands, we source data from the Economics and Statistics Office, Government of the Cayman Islands (<http://www.eso.ky/>). For Guernsey, we source data from the States of Guernsey (<http://www.gov.gg/>).

| | |
|------------------------|--|
| Distance | The great circle distance between Germany's main agglomeration and host country <i>i</i> 's main agglomeration, weighted by the share of the agglomeration in the overall country's population, respectively. Data source: Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). For Liechtenstein, we take the Swiss value (Zurich). For Montenegro, we take the Serbian value (Belgrade). For Guernsey, we take the value of Great Britain (London). |
| Adjacency | A dummy variable obtaining the value of one if host country <i>i</i> shares a border with Germany. |
| Rule of Law | Reflecting the level to which negotiators have confidence in and stick to the rules of society. It captures particularly the qualities of contract enforcement, property rights, the police, as well as the probability of crime and violence in host country <i>i</i> . <i>Rule of Law</i> may range between -2.5 and 2.5 and is measured on an annual basis. Data source: World Governance Indicators of the World Bank. For Guernsey, we take the value of Great Britain. |
| Voice & Accountability | Indicating the degree to which citizens of host country <i>i</i> are given the possibility to elect their government. In addition, it represents the extent to which the freedom of expression, the freedom of association, and a free media are established in host country <i>i</i> . <i>Voice & Accountability</i> may range between -2.5 and 2.5 and is measured on an annual basis. Data source: World Governance Indicators of the World Bank. For Guernsey, we take the value of Great Britain. |

D Econometric Framework Chapter 4

We model *Number Subsidiaries* (for the sake of simplicity, denoted with n in the following) as a Poisson distributed random variable with the probability function:

$$f(n_{ijt}) = \frac{\exp(-\lambda_{ijt}) \lambda_{ijt}^{n_{ijt}}}{n_{ijt}!}, \quad n_{ijt} = 0, 1, 2, \dots \quad (1)$$

where λ_{ijt} is the intensity parameter. This is a one-parameter distribution with mean and variance equal to λ_{ijt} :

$$E(n_{ijt}) = \text{Var}(n_{ijt}) = \lambda_{ijt} \quad (2)$$

To integrate observable exogenous variables, such as the *Tax Attractiveness Index* and other country-level characteristics which are supposed to determine the location decision, and hence, the number of subsidiaries in a specific host country, the mean λ_{ijt} is parameterized as:

$$\lambda_{ijt} = \exp(\mathbf{x}'_{ijt} \boldsymbol{\beta}) \quad (3)$$

where \mathbf{x}'_{ijt} is a vector of regressors, $\mathbf{x}'_{ijt} = [x_{1ijt}, \dots, x_{kijt}]$, and $\boldsymbol{\beta}$ is a vector of coefficients.

The exponential form of (3) ensures the non-negativity of λ_{ijt} . Equations (2) and (3) together yield the conditional mean:

$$E(n_{ijt} | \mathbf{x}_{ijt}) = \exp(\mathbf{x}'_{ijt} \boldsymbol{\beta}) \quad (4)$$

Further, equations (1) and (3) jointly define the Poisson regression model. In the statistics literature, the model is also called the *log-linear model* because the logarithm of the conditional mean is linear in the parameters ($\log E(n_{ijt} | \mathbf{x}_{ijt}) = \log \lambda_{ijt} = \mathbf{x}'_{ijt} \boldsymbol{\beta}$). Finally, the vector $\boldsymbol{\beta}$ can be estimated by using the maximum likelihood method, the standard estimation method for count models (see, e.g., Cameron and Trivedi 1998; Winkelmann and Zimmermann 1995).

Equation (2) shows that the Poisson model implies equality of (conditional) mean and (conditional) variance, which is also called the *equidispersion* property. In applied research, this assumption is frequently violated ($\text{Var}(n_{ijt} | \mathbf{x}_{ijt}) > \text{E}(n_{ijt} | \mathbf{x}_{ijt})$) which also holds in our case: the variance of *Number Subsidiaries* exceeds its mean (see Table 4-2 Panel A). Moreover, formal tests confirm that the null hypothesis of equidispersion must be rejected. Therefore, the Poisson model proves to be inappropriate for our purposes. However, provided that the conditional mean is correctly specified, the estimator for the regression parameters remains consistent. Then, the pseudo-maximum likelihood or quasi-maximum likelihood approach can be used to estimate β . Nevertheless, violations of the variance assumption result in an inefficient estimator and may cause the standard errors to be biased (see, e.g., Cameron and Trivedi 1998).

Since the Poisson model is not suitable, we use the negative binomial regression model as our preferred specification. Compared to the Poisson model, it is more flexible since the underlying distribution allows for overdispersion while the mean $\text{E}(n_{ijt}) = \lambda_{ijt}$ is preserved. By using a Poisson-gamma mixture distribution, the overdispersion parameter α is integrated into the probability function for n_{ijt} , yielding the negative binomial distribution:

$$f(n_{ijt} | \alpha, \lambda_{ijt}) = \frac{\Gamma(\alpha^{-1} + n_{ijt})}{\Gamma(\alpha^{-1})\Gamma(n_{ijt} + 1)} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \lambda_{ijt}} \right)^{\alpha^{-1}} \left(\frac{\lambda_{ijt}}{\lambda_{ijt} + \alpha^{-1}} \right)^{n_{ijt}}, \quad (5)$$

$$\alpha \geq 0, \quad n_{ijt} = 0, 1, 2, \dots$$

$\Gamma(\cdot)$ signifies the gamma integral which specializes to a factorial in case of an integer argument. If α equals zero, the negative binomial model converges to the

Poisson model (see, e.g., Cameron and Trivedi 2010). The literature differentiates between the so-called negative binomial model of type 1, where the conditional variance is a multiple of the conditional mean ($\text{Var}(n_{ijt} | \mathbf{x}_{ijt}) = (1 + \alpha)\lambda_{ijt}$, $E(n_{ijt} | \mathbf{x}_{ijt}) = \lambda_{ijt} = \exp(\mathbf{x}'_{ijt}\boldsymbol{\beta})$), and the negative binomial model of type 2, where the conditional variance is quadratic in the mean ($\text{Var}(n_{ijt} | \mathbf{x}_{ijt}) = (1 + \alpha\lambda_{ijt})\lambda_{ijt}$) (see, e.g., Cameron and Trivedi 1998). We apply the negative binomial model of type 2.

Moreover, we account for excess zeros that are present in our data by applying a zero-inflated negative binomial model. The zero-inflated negative binomial model relaxes the assumption that the excess zeros and the positive outcomes for *Number Subsidiaries* result from the same data-generating process. It combines the negative binomial model with the count density $f_2(\cdot)$ with a binary process (probit or logit) with a density of $f_1(\cdot)$. If the binary process assumes a value of zero, with a probability of $f_1(0)$, then $n_{ijt} = 0$. If, however, the binary model leads to a value of one, with a probability of $f_1(1)$, then n_{ijt} takes on the count values $0, 1, 2, \dots$ from the count density $f_2(\cdot)$. Hence, zeros may appear as an outcome of the binary process, and furthermore, they may result from the count process which requires the binary variable to be one. Neglecting regressors for the sake of simplicity, the zero-inflated model has a density of:

$$f(n_{ijt}) = \begin{cases} f_1(0) + \{1 - f_1(0)\} f_2(0) & \text{if } n_{ijt} = 0 \\ \{1 - f_1(0)\} f_2(n_{ijt}) & \text{if } n_{ijt} \geq 1 \end{cases} \quad (6)$$

The variables included in the $f_1(\cdot)$ density do not have to equal those in the $f_2(\cdot)$ density. For the negative binomial model with count density $f_2(\cdot)$, the conditional

mean is $\exp(\mathbf{x}'_{2ijt}\boldsymbol{\beta})$. Therefore, the whole model (including zeros) has a conditional mean of:

$$E(n_{ijt} | \mathbf{x}_{ijt}) = \{1 - f_1(0 | \mathbf{x}_{ijt})\} \times \exp(\mathbf{x}'_{2ijt}\boldsymbol{\beta}_2) \quad (7)$$

where $1 - f_1(0 | \mathbf{x}_{ijt})$ signifies the probability that the binary process takes on a value of one (see, e.g., Cameron and Trivedi 2010).

E Additional Analyses Chapter 4

Table E.I: Correlation between Different Dependent Variables and Country-Level Controls

This table reports correlation coefficients for all variables used in this study. The underlying sample for all dependent variables used ((1)-(6)) is based on the subsidiaries of 29 German parent companies (DAX30) over years 2005 to 2009. The subsidiaries are situated in 97 different host countries. *Number Subsidiaries* signifies the number of subsidiaries that parent company *j* operates in year *t* in host country *i*. *Number Subsidiaries (relative)* is defined as the number of subsidiaries that parent company *j* operates in year *t* in host country *i* divided by the total number of foreign subsidiaries that parent company *j* holds in year *t*. *Equity* is the sum of equity (in current mill. EUR) that parent company *j* holds in year *t* in host country *i*. *Equity (relative)* is the sum of equity (in current mill. EUR) that parent company *j* holds in year *t* in host country *i* divided by the total sum of equity that parent company *j* holds in year *t* in foreign countries. *Number Cons. Subsidiaries* refers to the number of consolidated subsidiaries that parent company *j* operates in year *t* in host country *i*. *Number Subsidiaries (all)* is the aggregated number of subsidiaries that all 29 parent companies together operate in year *t* in host country *i*. *Tax Attractiveness Index* is an index summarizing 18 different tax factors representing host country *i*'s tax attractiveness. The index is restricted to values between zero and one. High index values indicate a favorable tax environment. *GDP* is the natural logarithm of host country *i*'s GDP in constant USD for the year 2000. *Similarity* is an index defined as one minus the ratio of the absolute value of host country *i*'s GDP per capita minus Germany's GDP per capita to the higher of both GDPs per capita (GDP per capita in constant USD for the year 2000, respectively). *Distance* is defined as the natural logarithm of the population-weighted great circle distance between main agglomerations of Germany and host country *i*. *Adjacency* is a dummy variable obtaining the value one if host country *i* shares a border with Germany. *Rule of Law* and *Voice & Accountability* represent governance indicators of host country *i*. They may range from -2.5 to 2.5. All country-level variables are measured on an annual basis. Insignificant correlations ($p \geq 0.1$) are reported in italics.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|------------------------------------|--------------|--------------|-------------|-------|--------------|-------|-------|-------------|-------|-------|------|------|------|
| (1) Number Subsidiaries | 1.00 | | | | | | | | | | | | |
| (2) Number Subsidiaries (relative) | 0.81 | 1.00 | | | | | | | | | | | |
| (3) Equity | 0.33 | 0.33 | 1.00 | | | | | | | | | | |
| (4) Equity (relative) | 0.39 | 0.55 | 0.62 | 1.00 | | | | | | | | | |
| (5) Number Cons. Subsidiaries | 0.97 | 0.79 | 0.29 | 0.38 | 1.00 | | | | | | | | |
| (6) Number Subsidiaries (all) | 0.51 | 0.65 | 0.31 | 0.39 | 0.46 | 1.00 | | | | | | | |
| (7) Tax Attractiveness Index | <i>-0.01</i> | <i>-0.01</i> | <i>0.01</i> | 0.04 | <i>-0.01</i> | -0.02 | 1.00 | | | | | | |
| (8) GDP | 0.29 | 0.40 | 0.15 | 0.20 | 0.26 | 0.58 | -0.36 | 1.00 | | | | | |
| (9) Similarity | 0.17 | 0.22 | 0.10 | 0.15 | 0.15 | 0.33 | 0.36 | 0.35 | 1.00 | | | | |
| (10) Distance | -0.08 | -0.09 | -0.06 | -0.10 | -0.06 | -0.16 | -0.31 | <i>0.01</i> | -0.29 | 1.00 | | | |
| (11) Adjacency | 0.09 | 0.14 | 0.07 | 0.13 | 0.07 | 0.17 | 0.19 | 0.20 | 0.34 | -0.55 | 1.00 | | |
| (12) Rule of Law | 0.15 | 0.21 | 0.10 | 0.15 | 0.13 | 0.30 | 0.43 | 0.20 | 0.81 | -0.40 | 0.35 | 1.00 | |
| (13) Voice & Accountability | 0.12 | 0.16 | 0.08 | 0.13 | 0.11 | 0.24 | 0.25 | 0.09 | 0.64 | -0.39 | 0.35 | 0.79 | 1.00 |

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