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THE TAX ATTRACTIVENESS INDEX: METHODOLOGY

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Aim of this document: To explain the methodology of the *Tax Attractiveness Index*, an index which measures and compares the tax attractiveness of 100 countries on a year-by-year basis.

Data of the *Tax Attractiveness Index* including its components can be downloaded and used for non-commercial purposes free of charge: **www.tax-index.org**

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1. Introduction and aim of this document

With increasing globalization, countries are competing for companies and investment. Because income tax law has not been globally harmonized so far, international companies view a country's tax conditions as an important location factor. Corporate location decisions and, therefore, a country's tax attractiveness depend on a variety of tax factors. In this document, we present our tax measurement tool — the *Tax Attractiveness Index* — which includes 20 different equally weighted tax components and provides a comprehensive picture of a country's tax environment. Specifically, the *Tax Attractiveness Index* covers 20 components, which include Anti-Avoidance Rules, CFC Rules, Corporate Income Tax Rate, Depreciations, EU Member State, Group Taxation Regime, Holding Tax Climate, Loss Carryback, Loss Carryforward, Patent Box Regime, Personal Income Tax Rate, R&D Tax Incentives, Taxation of Capital Gains, Taxation of Dividends Received, Thin Capitalization Rules, Transfer Pricing Rules, Treaty Network, Withholding Tax Rate Dividends, Withholding Tax Rate Interest, and Withholding Tax Rate Royalties.

By making the *Tax Attractiveness Index* data publicly available, we want to achieve several aims: First, because the *Tax Attractiveness Index* allows a comparison of tax environments across countries, governments and politicians can compare their current tax position to other jurisdictions. Second, companies and consultants can use the index to evaluate target countries' tax environments and tax planning opportunities. Third, international researchers can use the *Tax Attractiveness Index* as a tax measurement tool in their studies — even if they have only limited tax knowledge — simply by selecting countries and years of interest. Thanks to the broad coverage of tax factors, applying the *Tax Attractiveness Index* can generate further insights into the influence of taxation and can stimulate a huge set of new research questions.

The aim of this document is to explain the *Tax Attractiveness Index*. The index includes 100 countries and will be updated on a yearly basis and is available since 2007. Users can access the overall *Tax Attractiveness Index* values or the country rankings which we provide on the webpage, or they can compose their own index with individual components ("Make your own index" on www.tax-index.org). The underlying data of the *Tax Attractiveness Index* including its components can be downloaded and used for non-commercial purposes free of charge.

2. Components of the *Tax Attractiveness Index*

This methodology description explains the *Tax Attractiveness Index* — a broad, transparent tax measurement tool — and its single components. The index includes 20 tax parameters that characterize a country's tax environment with data available for 100 countries. We obtain the tax factor data primarily from the *Global Corporate Tax Handbooks* of the International Bureau of Fiscal Documentation (IBFD), PricewaterhouseCoopers' *Worldwide Tax Summaries – Corporate Taxes,* Ernst & Young's *Worldwide Corporate Tax Guides*, Deloitte's *International Tax Highlights*, KPMG's *Corporate Tax Rate Surveys*, and the *OECD Tax Database*.[1] Whenever sources yield contradictory information, we rely on the sources that provide the most details.

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[1] For certain variables, more specific sources were used (e.g., PwC *Global Research & Development Incentive Group Report* for the component Patent Box Regime, KPMG's *Individual Income Tax Rate Surveys* for the component Personal Income Tax Rate).

The *Tax Attractiveness Index* is a country-specific measurement tool, but contains cross-border tax parameters, e.g., withholding tax rates. However, unlike bilateral effective tax rates, the index does not refer to specific *country pairs* but keeps a one-country perspective. Therefore, the *Tax Attractiveness Index* offers the opportunity to compare tax environments across countries and to evaluate tax planning opportunities in a general rather than a specific bilateral context. All tax factors included in the index, and their respective characteristics described, relate to legally independent corporate entities.

Below we describe the specific measurement scale of each factor and why we think it is a relevant component of the *Tax Attractiveness Index*.[2] The index and each component is normalized to range between zero and one — one being very attractive and zero being not attractive at all.[3]

[1] Anti-Avoidance Rules

Description: By means of anti-avoidance rules, tax authorities try to combat tax avoidance and try to challenge fictitious or artificial transactions. Anti-avoidance legislations prohibit transactions whose primary or dominant purpose is the reduction of a tax liability; moreover, transactions which are *solely* carried out to obtain a tax benefit are to be prevented. In case a certain transaction falls under the scope of anti-avoidance legislation, the tax liability is determined notwithstanding the benefits that would result from the abuse of the law. Therefore, companies located in countries with strict anti-avoidance rules have a smaller set of tax planning options and thus are considered less attractive.

Measurement: For countries where no anti-avoidance rules are in place, *Anti-Avoidance Rules* receives the value one. In case national tax law contains a general anti-avoidance rule, a general substance-over-form principle is applied but not codified, or only a special anti-avoidance law is applicable, the respective country receives the value 0.5. For countries where a general rule plus special anti-abuse clauses apply, *Anti-Avoidance Rules* receives the value zero.

Further Information: The design of anti-avoidance rules differs greatly across countries. In many jurisdictions, a general anti-avoidance rule 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 receives the value 0.5. There are, however, countries in which a general anti avoidance rule is not explicitly codified in tax law but the general substance-over-form principle is in force, as it is applied by the courts. In such cases, *Anti-Avoidance Rules* also equals 0.5. Here, 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. In cases, where no general anti-avoidance rule is applicable but only a special anti-avoidance rule applies (e.g., Tunisia, Ukraine until 2010), we also assign the value 0.5. Special anti-avoidance rules are only considered if not already covered by other components (i.e., Transfer Pricing Rules, Thin Capitalization Rules and CFC Rules). For reasons of simplicity, we do not distinguish between the different contents of the special anti-avoidance rules (e.g., special anti-tax haven legislations in Italy, Portugal, and Brazil or anti-treaty shopping legislation in Germany). Countries where a general rule plus special anti-abuse clauses apply offer the least attractive anti-avoidance rules. That is why *Anti-Avoidance Rules* equals zero for these jurisdictions.

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[2] Specific country examples given to explain a rule refer to a specific year and may change over time.
[3] For countries with a corporate tax rate of zero, some rules are obsolete. If rules are directly connected to the corporate income tax rate, these variables are corrected to one (very attractive) even if this special rule does not exist (e.g., a group taxation regime does not bring further tax advantages for companies in a zero-tax country, as losses of other companies cannot further reduce the tax burden. In this zero tax country, group taxation regime receives the value one (very attractive) although such a rule does not exist).

[2] CFC Rules

Description: High tax countries implement controlled foreign corporation (CFC) rules to prevent the erosion of their tax base by means of profit shifting to non-operational subsidiaries in low tax countries that only generate passive income (e.g., interest and royalties). 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 total tax burden if no CFC rules are in place. If the requirements of CFC rules are fulfilled, tax authorities of the parent country are able to include non-repatriated income of corporations in foreign countries in the domestic corporate tax base of the parent companies. Therefore, companies in countries with CFC rules have less leeway in their tax planning activities.

Measurement: *CFC Rules* equals one if a country has not implemented controlled-foreign corporation rules and zero if they have.

[3] Corporate Income Tax Rate

Description: The statutory corporate income tax rate is a main determinant of the corporate tax burden. Therefore, countries with a lower statutory tax rate are more attractive than countries with high statutory tax rates.

Measurement: *Corporate Income Tax Rate* combines the corporate income tax rate including all surcharges imposed by the central government as well as sub-central government taxes. If progressive tax rates apply, we take the maximum tax rate into account. If corporate tax payers are subject to a distribution tax levied on distributed profits instead of on accrued profits, we treat the distribution tax rate as the statutory tax rate. Using the maximum observed tax rate among all countries in a year, the factor *Corporate Income Tax Rate* [=(maximum tax rate per year – tax rate per country per year) / maximum tax rate per year] is normalized to range between zero and one. A higher value indicates a more attractive (i.e., lower) statutory tax rate.

Further Information: Surcharges imposed by the central government as well as taxes levied by sub-central government(s) include, for example, U.S. state income taxes, Swiss cantonal taxes as well as regional trade taxes levied, for example, in Germany. If those taxes vary across administrative units, we use figures of representative territorial communities (e.g., New York for the United States, Zurich for Switzerland). 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 corporate income tax rate is zero, but we treat the distribution tax as corporate income tax rate. In this way, we distinguish Macedonia and Estonia from tax havens which actually do not levy taxes on corporate income at all.

[4] Depreciations

Description: For most companies, tax depreciation rules are important determinants of the tax base. The faster assets can be depreciated, the earlier the tax base can be lowered and the higher are present values of tax savings. As depreciation for machinery is too specific for the variety of firms in different industries, we account for this variable by focusing on depreciations on commercial property.

Measurement: The component *Depreciations* calculates the pre-tax present value of the depreciation allowances granted for one unit of expense on commercial property. The variable is normalized to range between zero and one by dividing the resulting present values for each country by the highest observed value among all countries in a year.

Further Information: In some countries' tax laws, commercial property is either not defined or depreciation rates depend on further attributes. If we cannot find information on depreciation rates of commercial properties, we use the rate for industrial buildings. If further attributes apply, we employ the rate for solid buildings in urban areas that have an expected lifetime of 25 years or more. Sometimes, due to

highly differing regulations on certain attributes, only a range of rates is given in the underlying sources. If this is the case, we employ the minimum rate. To calculate the present value of depreciations, we utilize the 10-year rolling average of monthly interest rates for German 10-year treasury bonds as our risk-free interest rate.

[5] EU Member State

Description: Within the European Union (EU) the Parent-Subsidiary Directive as well as the Interest and Royalties Directive aim to eliminate withholding taxes on dividends, interest and royalties and, thus, reduce double taxation.

Measurement: *EU Member State* is a dummy variable indicating whether a country is a member of the EU (value=1) or not (value=0). Since to the EU has entered into a similar agreement with Switzerland, this country receives the value one, too.

Further Information: EU member states profit from advantageous rules, e.g., the Parent Subsidiary Directive, but nevertheless, many tax factors such as tax rates or the tax base still differ among member states. In the EU, the Parent-Subsidiary Directive as well as the Interest and Royalties Directive apply. These multilateral agreements abolish withholding taxes on dividends, interest and royalties. Hence, dividends, interest, and royalties can be transferred free of withholding tax between two EU member countries. The EU entered into a similar agreement with Switzerland.

[6] Group Taxation Regime

Description: Under group taxation regimes, multiple companies belonging to the same corporate group are allowed to file a consolidated tax return. Thus, group members' profits and losses are aggregated and the aggregate is taxed. 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.

Measurement: For countries that do not allow for a group relief scheme, *Group Taxation Regime* amounts to the value zero, while for countries offering such a system but restricting it to domestic group members, *Group Taxation Regime* equals 0.5. Countries allowing for an international group relief system receive the value one.

Further Information: Evaluating tax consolidation regimes, we disregard 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. In other countries, requirements regarding a minimum participation or a minimum holding period apply. However, if the rule is only available for certain types of companies, the rule is not considered attractive and receives the value zero. In Israel, for instance a consolidated return is only possible for industrial companies that are in the same line of production.

[7] Holding Tax Climate

Description: Holdings, i.e., companies that hold shares of other companies, serve as a central tool in many corporate tax planning strategies. Besides tax factors applying to both holdings and operating entities, the location decision for holdings also depends on specific tax factors. Special rules for holdings include the exemption from current taxation (e.g., Luxembourg until 2010) or exemption from local corporate income tax (e.g., Switzerland). Additionally, in some countries holding companies have a special status for the application of participation exemption rules.

Measurement: *Holding Tax Climate* is a dummy variable indicating whether a country offers a special holding regime (value=1) or not (value=0).

Further Information: The holding tax climate is positively influenced by special holding rules and holding status requirements for the application of certain rules. Those rules either include exceptions of corporate taxes on regular business income or special participation exemption rules. If countries offer participation exemption rules, we only consider them if they are not covered by other components (i.e., *Taxation of Dividends Received*, *Taxation of Capital Gains*).

[8] Loss Carryback

Description: Loss carryback rules allow for current losses to be offset against profits of past periods. This way companies can lower their tax burden. Hence, multinational enterprises perceive loss carryback possibilities as being attractive.

Measurement: For countries that offer a loss carryback, *Loss Carryback* receives the value one, and zero if they do not.

Further Information: Limitations in respect to the amount that can be carried back, which apply e.g., in Germany, are not taken into account. Moreover, we disregard any time restriction that may be linked to loss carryback provisions. In so doing, for example, France (where national tax law provides a loss carryback into the preceding three years) and the Netherlands (that allow only a one-year carryback period) are treated in the same manner. However, where the loss carryback is restricted to certain enterprises (e.g., small and medium enterprises in Korea) or to certain losses and profits (e.g., losses from long term projects with profits from the same project in Egypt) the rule is not considered.

[9] Loss Carryforward

Description: Loss carryforwards allow for current losses to be offset against profits of future periods. By doing so, companies can lower their future tax burden. Hence, multinational enterprises perceive generous loss carryforward possibilities as being attractive.

Measurement: Countries that offer a loss carryforward up to five years obtain a *Loss Carryforward* value of zero, while for countries in which losses can be carried forward for more than five and up to twenty years, *Loss Carryforward* equals 0.5. Countries where losses can be carried forward more than twenty years obtain the value one.

Further Information: Limitations in respect to the amount that can be carried forward, which apply e.g., in Germany, are not taken into account. Time restrictions are considered. Loss offset possibilities require taxable profits in the same amount that losses occurred. The longer the loss carryforward possibility is available, the more likely all losses of a company can be offset.

[10] Patent Box Regime

Description: Companies owning substantial intellectual property (e.g., patents or trademarks) often provide third parties with licenses and receive royalty payments in return. In some countries royalty income is taxed lower than ordinary business income (i.e., patent box regime applies). This is either reached by a reduced tax rate for royalties or a tax exemption of a certain percentage of royalties. Countries that tax royalties at lower effective tax rates are therefore attractive for companies.

Measurement: The component *Patent Box Regime* is the normalized effective tax rate on royalties received. The effective tax rate on royalties is either directly illustrated in the underlying source or needs to be calculated from the tax-exempt percentage of royalties. It is calculated as [=(1 – tax exempt income from royalties) × statutory tax rate on business income]. This effective tax rate is then normalized to range between zero and one [=(maximum tax rate on royalties per year – tax rate on royalties per country per year) / maximum tax rate on royalties per year].

Further Information: As information on patent box regimes is very limited, we cannot rely on many sources. Thus, if we cannot find information whether a patent box regime is in place, we assume the country does not have one in place.

[11] Personal Income Tax Rate

Description: The personal income tax rate determines the tax burden for employees. Therefore, it increases labor cost for corporations since (internationally mobile) employees demand (c.p.) a higher wage in countries with higher personal income tax rates. Thus, low personal income tax rates are favorable for companies.

Measurement: *Personal Income Tax Rate* is based on the statutory personal income tax rate imposed by the central and sub-central government. If a progressive tax rate applies, we include the maximum rate. We account for sub-central taxes by either using averages (e.g., for Belgium and Sweden) or by comprising the tax rate of a representative city or region (e.g., Zurich for Switzerland; Helsinki for Finland). We include other surcharges, such as solidarity surcharges, only if precise numbers are available. Using the maximum observed tax rate among all countries in a year, the factor *Personal Income Tax Rate* [=(maximum tax rate per year – tax rate per country per year) / maximum tax rate per year] is normalized to range between zero and one. A higher value indicates a more attractive (i.e., lower) personal income tax rate.

[12] R&D Tax Incentives

Description*:* R&D tax incentives are important for many companies since their R&D investments usually are large expenditures and affect their future product offerings. Some countries offer tax incentives for resident companies conducting R&D, which help companies to lower their after-tax R&D costs. Possible R&D incentives covered by this component are tax credits and tax deductions.

Measurement*:* The component *R&D Tax Incentives* amounts to the value one if a country's R&D tax credits or deductions in relation to R&D costs are among the top 25% most attractive incentives worldwide in the respective year. If a country offers tax incentives which are not among the 25% most attractive, *R&D Tax Incentives* receives the value 0.5. If no *R&D Tax Incentives* are offered, we assign the value zero.

Further Information: If both credits and deductions are offered, the more attractive incentive in terms of absolute value is used. If credits or deductions depend on requirements that firms generally fulfil, we assume them to be fulfilled. However, if countries additionally offer incremental tax deductions depending on very specific requirements, we do not take these incentives into account in the *R&D Tax Incentives* variable. The variable *R&D Tax Incentives* differs from our variable *Patent Box Regime* as it measures the attractiveness of investments in R&D instead of the royalties arising from R&D.

[13] Taxation of Capital Gains

Description: The taxation of capital gains causes economic double taxation, because capital gains include after-tax retained earnings or expected future after-tax income of the divested company. Thus, many countries grant a (partial) tax exemption for capital gains.

Measurement: We quantify the taxation of capital gains by considering the percentage of tax exemption. If capital gains are completely disregarded when determining taxable income, *Taxation of Capital Gains* equals one. The same applies if foreign capital gains are not included in taxable income due to the territoriality principle. If capital gains are only partially exempt, the proportion of exemption is displayed (e.g., 0.95 in Germany).

Further Information: The participation exemption for capital gains might depend on certain conditions, such as a minimum holding period (the case, e.g., in France) or a taxation test (as done, e.g., in Belgium). In Australia, an entire set of complex regulations applies.[4] 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 to 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. Partial tax exemptions are recorded with values between zero and one. For example, in Germany only 95% of capital gains are exempt from taxation resulting in a value for the variable *Taxation of Capital Gains* of 0.95.

[14] Taxation of Dividends Received[5]

Description: Within a multinational group, profits generated in one subsidiary may be distributed as a dividend to the parent company. From the perspective of a multinational enterprise, it is most attractive if profits can be transferred without the burden of further taxation, when the dividend is received. 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.

Measurement: We measure the taxation of dividends received by considering the percentage of tax exemption. Countries where dividends are not subject to tax at all (100% exemption) receive the value one. If only 95% of the dividends can effectively be obtained free of tax, *Taxation of Dividends Received* is 0.95. If only dividends received from other domestic subsidiaries are tax exempt, we assign the value zero. This measurement is similar to *Taxation of Capital Gains*.

Further Information: In most countries, the participation exemption is subject to certain requirements, such as a minimum participation (e.g., the Netherlands, Spain) or a minimum holding period (e.g., Austria). For reasons of simplicity, we do not take these requirements into consideration, that is, the value for *Taxation of Dividends Received* assumes that the requested conditions are satisfied. We focus on cross-border transaction since they are decisive for international tax planning purposes. Therefore, jurisdictions that apply only a national participation exemption receive the value zero. Even if a country grants a tax credit on foreign profit taxes paid (e.g., Argentina, Egypt), they receive the value zero. If, however, the participation exemption is limited to foreign dividends received from subsidiaries that reside in the European Union (e.g., Bulgaria, Poland), we consider the prerequisites of an international participation exemption to be fulfilled and assign the value one to this country. Another issue we encountered 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. In case the credit method applies, *Taxation of Dividends Received* equals zero, even though a tax credit is available to mitigate double taxation.[6] Moreover, we take the fact that several tax regimes

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[4] 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.

[5] In contrast to the component *Withholding Tax Dividends*, *Taxation of Dividends Received* covers the taxation of dividends in the residence country of the parent corporation instead of withholding taxes being paid by the subsidiary in the source country.

[6] Since the tax credit available is limited to the domestic tax level, the tax burden which is higher (either the country of the affiliate and the one in which the parent company is located) is decisive. If the country of the parent

are based on the territoriality principle into consideration (e.g., Bolivia, Costa Rica).[7] Since our focus is on cross-border transaction, countries applying the territoriality principle receive the value one.

[15] Thin Capitalization Rules

Description: Multinational enterprises have the opportunity to allocate their debts across countries in the most efficient way by means of internal financing strategies. Debt financing can be considered more favorable to equity financing as interest is deductible for tax purposes. 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. To curb the intensive use of debt financing, governments especially in high tax countries have adopted thin capitalization rules. These rules aim at limiting the deductibility of interest expenses from taxable income and are therefore disadvantageous for companies.

Measurement: For countries where the deductibility of interests is not limited, *Thin Capitalization Rules* amounts to the value one. If tax authorities are entitled to limit the deduction of interests if its amount is considered to be inadequate, *Thin Capitalization Rules* equals 0.5. If governments impose clearly defined thin capitalization rules, *Thin Capitalization Rules* equals zero.

Further Information: 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 with its three sets of rules codified in national tax law.[8] In many countries, companies can avoid being subject to thin capitalization rules if they fulfill certain conditions (e.g., Germany, Italy). In sum, thin capitalization rules are quite complex and differ greatly 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 that 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 (e.g., Cyprus, India). Furthermore, in some locations thin capitalization rules exist, but are not clearly defined; that is, no official debt-to-equity ratio or other specific rules limiting the interest deduction are provided. However, tax authorities are entitled to limit the deduction of interest expenses if its amount is considered to be inadequate (beyond general anti-avoidance rules or transfer pricing rules). For countries that fall under this category, the value equals 0.5 (e.g., Austria). Finally, governments that impose clearly defined thin capitalization rules are given the value zero, since the existence of such rules is not an attractive feature in a tax environment. For reasons of simplicity, we neither differentiate between the various rules limiting interest deduction nor between any other characteristics that may be linked with thin capitalization rules. However, if the rules only apply to certain industries, *Thin Capitalization Rules* receives the value zero (e.g., in Botswana thin capitalization rules only apply for mining and financial service companies).

[16] Transfer Pricing Rules

Description: When companies conduct transactions with related companies they need to set prices to charge for products and services in order to ensure comparability to a transaction between non-related

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company levies higher taxes than the country of the affiliate, multinational enterprises have an incentive to defer repatriation of profits. As most countries that apply the credit method maintain a comparatively high level of taxation, they do not offer favorable tax conditions for dividends received.

[7] Companies are subject to tax on their domestic-source income only. Therefore, dividends received from foreign corporations are not subject to tax, although dividends received from resident companies might be included in the taxable income.

[8] 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 (e.g., 4.1% in 2015) and an EBIT test limiting the deduction of net financing expenses to 80% of earnings before interest and tax apply.

parties. In many countries tax authorities have implemented transfer pricing rules that demand these transactions to be priced at arm's length. Countries with such specific rules cause high administrative effort and provide less leeway for profit shifting and are therefore less attractive from a corporate perspective.

Measurement: The component *Transfer Pricing Rules* assumes the value one if there are no specific rules concerning transfer pricing codified in law (beyond anti-avoidance rules) and the value zero if there are.

[17] Treaty Network

Description: Double tax treaties help to avoid the double taxation of profits from foreign sourced income. 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. Therefore, companies located in countries that have signed double tax treaties with many countries internationally (c.p.) have an advantage over corporations with a limited treaty network.

Measurement: *Treaty Network* is based on the number of double tax treaties in force per year. Double tax treaties that are under negotiation but have not yet been ratified are not taken into consideration. Even those that have been adopted but are not yet in force are disregarded. Furthermore, we do not account for Tax Information Exchange Agreements. *Treaty Network* is normalized to range between zero and one by dividing the number of double tax treaties in a country by the maximum number of treaties observed in any one country in a given year. A higher value for *Treaty Network* indicates a more extensive double tax treaty network.

[18] Withholding Tax Rate Dividends

Description: By means of withholding taxes, the source country tries to secure its share in tax revenue. However, from a company's perspective, withholding taxes are disadvantageous and can increase the total tax burden. Profits that have already been subject to corporate taxation are taxed again when distributed (in contrast to dividends that are not distributed across borders). Therefore, companies in countries with low withholding taxes can distribute dividends with a lower tax burden.

Measurement: *Withholding Tax Rate Dividends* accounts for the withholding tax rate levied on dividends. We include the standard withholding tax rate implemented in national law, irrespective of reductions implemented in tax treaties. If national legislation includes exceptions, we use the tax rates that apply in the standard case. Using the maximum observed tax rate among all countries in a year, the factor *Withholding Tax Rate Dividends* [=(maximum tax rate per year – tax rate per country per year) / maximum tax rate per year] is normalized to range between zero and one. A higher value indicates a more attractive (i.e., a lower) withholding tax rate.

[19] Withholding Tax Rate Interest

Description: By means of withholding taxes, the source country tries to secure its share in tax revenue. However, from a company's perspective, withholding taxes are disadvantageous because tax interest payments to lenders are lowered. Therefore, lenders (c.p.) demand higher before-tax interest rates from debtors in countries with higher withholding tax rates on interest. Companies in countries with low withholding taxes can raise foreign debt at lower cost.

Measurement: *Withholding Tax Rate Interest* accounts for the withholding tax rate levied on interest. We include the standard withholding tax rate implemented in national law, irrespective of reductions implemented in tax treaties. If national legislation includes exceptions, we use the tax rates that apply in

the standard case. Using the maximum observed tax rate among all countries in a year, the factor *With-holding Tax Rate Interest* [=(maximum tax rate per year – tax rate per country per year) / maximum tax rate per year] is normalized to range between zero and one. A higher value indicates a more attractive (i.e., a lower) withholding tax rate.

[20] Withholding Tax Rate Royalties

Description: By means of withholding taxes, the source country tries to secure its share in tax revenue. However, from a company's perspective, withholding taxes are disadvantageous because tax royalty payments to licensors are lowered. Therefore, licensors (c.p.) demand higher before-tax interest rates from licensees in countries with higher withholding tax rates. Companies in countries with low withholding taxes can license intellectual property at lower cost.

Measurement: *Withholding Tax Rate Royalties* accounts for the withholding tax rate levied on royalties. We include the standard withholding tax rate implemented in national law, irrespective of reductions implemented in tax treaties. If national legislation includes exceptions, we use the tax rates that apply in the standard case. Using the maximum observed tax rate among all countries in a year, the factor *With-holding Tax Rate Royalties* [=(maximum tax rate per year – tax rate per country per year) / maximum tax rate per year] is normalized to range between zero and one. A higher value indicates a more attractive (i.e., a lower) withholding tax rate.

3.   Construction of the Tax Attractiveness Index

Since many of the tax components we regard are qualitative in nature, we have developed methods for quantifying them, as described above. For the purpose of the index, all tax factors are restricted to values between zero and one. In each case, the value one indicates the optimum (e.g., a corporate income tax rate of 0%; the possibility of cross-border group relief; no thin capitalization rules), while the value zero identifies least favorable tax conditions (e.g., the highest corporate income tax rate in the sample; no group relief; the existence of codified thin capitalization rules). Adding values for all 20 tax factors and dividing the sum by 20 yields the country-specific *Tax Attractiveness Index* value. Hence, the index represents an equally-weighted sum of 20 tax factors. The more the index value approaches the value one, the more attractive is the tax environment of a certain country.

Table 1: Tax Attractiveness Index Components

Tax Factor	Measurement	Weight
Anti-Avoidance Rules	1 - No anti-avoidance legislation applies 0.5 - General or special anti-avoidance rule applies 0 - General anti-avoidance rule + special rules apply	1/20
CFC Rules	1 - No CFC rules apply 0 - CFC rules apply	1/20
Corporate Income Tax Rate	(Max. tax rate$_t$-tax rate$_{it}$)/max. tax rate$_t$	1/20
Depreciations	Pre-tax present value of depreciation allowances$_{it}$/max. depreciation$_t$	1/20
EU Member State	1 - Member of the European Union 0 - No member of the European Union	1/20
Group Taxation Regime	1 - Cross-border group relief possible 0.5 - National group relief possible 0 - No group relief possible	1/20
Holding Tax Climate	1 - Holding regime applies 0 - No holding regime applies	1/20
Loss Carryback	1 - Loss carryback possible 0 - Loss carryback not possible	1/20
Loss Carryforward	1 - Loss carryforward > 20 years 0.5 - Loss carryforward > 5 years & ≤ 20 years 0 - Loss carryforward ≤ 5 years	1/20
Patent Box Regime	(1 - tax exempt royalty income) × statutory tax rate or effective tax rate on royalties	1/20
Personal Income Tax Rate	(Max. tax rate$_t$-tax rate$_{it}$)/max. tax rate$_t$	1/20
R&D Tax Incentives	1 - R&D tax credits or deductions in relation to R&D costs that are among the top 25% most attractive incentives worldwide 0.5 - R&D tax credits or deductions in relation to R&D costs that are not among the top 25% most attractive incentives worldwide 0 - No R&D Tax incentives are offered	1/20
Taxation of Capital Gains	Percentage of tax exemption (decimal number)	1/20
Taxation of Dividends Received	Percentage of tax exemption (decimal number)	1/20
Thin Capitalization Rules	1 - No thin capitalization rules apply 0.5 - Thin cap rules not clearly defined 0 - Thin capitalization rules apply	1/20
Transfer Pricing Rules	1 - No transfer pricing rules apply 0 - Transfer pricing rules apply	1/20
Treaty Network	Number of double tax treaties$_{it}$/ max. number of double tax treaties$_t$	1/20
Withholding Tax Rate Dividends	(Max. tax rate$_t$-tax rate$_{it}$)/max. tax rate$_t$	1/20
Withholding Tax Rate Interest	(Max. tax rate$_t$-tax rate$_{it}$)/max. tax rate$_t$	1/20
Withholding Tax Rate Royalties	(Max. tax rate$_t$-tax rate$_{it}$)/max. tax rate$_t$	1/20

Index versions resulting from alternative weighting schemes are highly correlated with the equally-weighted index (see Schanz et al. 2017, 279).[9]

The *Tax Attractiveness Index* enables us to compare tax environments across a broad range of countries (from emerging to developed countries, from large states to small islands, etc.). Off-shore tax havens, such as Bermuda, the Bahamas, the Cayman Islands, the British Virgin Islands, and the Netherlands Antilles, achieve the highest index values. Some European countries such as Luxembourg, the Netherlands, Ireland, Malta, Cyprus, and Austria also offer favorable tax conditions, which is reflected in their high index values. In contrast, Germany obtains an index value that only slightly exceeds the sample average, while China and the United States have very low values.

4. Comparison with other tax measurement tools

At this point, we do not include an in-depth analysis and comparison with other tax measurement tools. Instead, we refer to Keller and Schanz (2013) who analyze a former version of the *Tax Attractiveness Index*.[10] They show that the index corresponds with the OECD lists of countries and tax regimes that are perceived as constituting harmful tax competition. However, several exceptions exist, in which the country was removed from the black list even though the *Tax Attractiveness Index* increased. Overall, there is a correlation between the OECD list and the *Tax Attractiveness Index*, but they are not substitutes (Keller and Schanz, 2013, 25ff.).

A further interesting correlation is between statutory corporate income tax rates and the *Tax Attractiveness Index*. Even though Keller and Schanz (2013, 28ff.) find that the *Tax Attractiveness Index* and the statutory tax rate are negatively correlated with each other, the statutory income tax rate is not a suitable proxy for a country's tax environment. In contrast, countries often put in place attractive incentives other than the income tax rate to attract firms and investments. Especially in Europe, many high tax countries offer extremely favorable tax conditions by implementing several incentives other than a low statutory tax rate. Thus, the correlation between the statutory tax rate and the *Tax Attractiveness Index* is even positive in this case.

Finally, Keller and Schanz (2013, 30f.) show that effective average tax rates on country level that are used in several previous publications are not perfectly correlated with the *Tax Attractiveness Index*. Therefore, the index represents a genuinely innovative approach to measuring tax climates across countries.

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[9] Schanz, D., Dinkel, A., Keller, S., 2017. Tax Attractiveness and the Location of German-Controlled Subsidiaries. Review of Managerial Science 11, 251-297. Since the study exclusively contains German parent companies, the index used is a slightly modified version of the *Tax Attractiveness Index* with 18 components.
[10] Keller, S., Schanz, D., 2013. Measuring Tax Attractiveness across Countries. arqus Discussion Papers in Quantitative Tax Research No. 143, www.arqus.info, refers to a former version of the *Tax Attractiveness Index* with 16 components only.

5.   Using the webpage and "Make your own index"

The *Tax Attractiveness Index* is available online at www.tax-index.org.
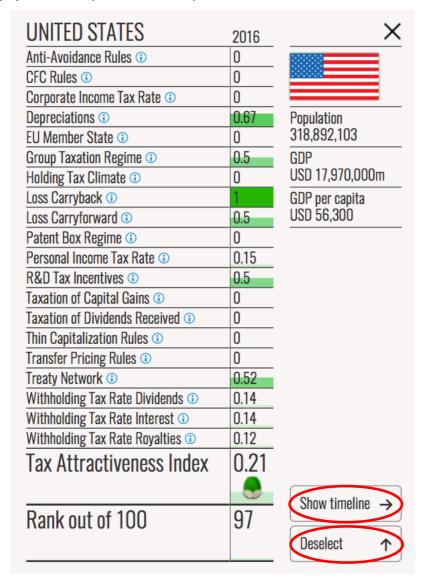
Figure 1: View of *the world map*

The webpage provides data for each of the 100 countries: The overall index value (0=lowest, 1=highest possible value), the rank value (rank out of 100, where rank 1 is the most tax attractive country), plus values of the 20 index components. Each value is available for each year starting in 2007. The *Tax Attrac-tiveness Index* is updated each year.

The webpage provides *different views* among which the visitor can choose: The *world map* (figure 1 and as seen on the welcome page), countries *sorted by name* (alphabetically), *sorted by region*, or *sorted by rank value*. By clicking on a country in either of these views, the *country details* (all 20 components) ap-pear plus *general country information* (the country flag, population, GDP, and GDP per capita) (figure 2).[11] In this view, users can select to view the development of the components and the ranking of the specific country by choosing *show timeline*. To make the comparison of different countries easier, users can select countries by dragging a country to the bottom of the page or by choosing *select* at the coun-try detail page.

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[11] Non-tax country information including flag, population, GPD, and GPD per capita is taken from CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook/). Data are 2015 estimates, if not differ-ently specified in Website Info.

Figure 2: Country-specific view (here: USA, 2016)

The selected countries are shown at the bottom of the webpage (figure 3). By choosing *compare details*, the selected countries can be compared.

Figure 3: Selection for country comparison

Figure 4: Selected country comparison for 2016

Selected Countries:	2016	UNITED ARAB EMIRATES	SINGAPORE	NETHERLANDS	FRANCE	GERMANY	UNITED STATES	
Anti-Avoidance Rules ⓘ		1	0	0	0	0	0	↓ Hide Details
CFC Rules ⓘ		1	1	1	0	0	0	
Corporate Income Tax Rate ⓘ		1	0.57	0.36	0.12	0.24	0	
Depreciations ⓘ		1	0.7	0.59	0.59	0.7	0.67	
EU Member State ⓘ		0	0	1	1	1	0	
Group Taxation Regime ⓘ		1	0.5	0.5	0.5	0.5	0.5	
Holding Tax Climate ⓘ		1	1	0	0	0	0	
Loss Carryback ⓘ		1	1	1	1	1	1	
Loss Carryforward ⓘ		1	1	0.5	1	1	0.5	
Patent Box Regime ⓘ		1	0.57	0.87	0.62	0.24	0	
Personal Income Tax Rate ⓘ		1	0.61	0.09	0	0.17	0.15	
R&D Tax Incentives ⓘ		1	1	0.5	0.5	0	0.5	
Taxation of Capital Gains ⓘ		1	1	1	0.88	0.95	0	
Taxation of Dividends Received ⓘ		1	1	1	0.95	0.95	0	
Thin Capitalization Rules ⓘ		1	1	0	0	0	0	
Transfer Pricing Rules ⓘ		1	0	0	0	0	0	
Treaty Network ⓘ		0.52	0.64	0.73	1	0.75	0.52	
Withholding Tax Rate Dividends ⓘ		1	1	0.57	0.14	0.25	0.14	
Withholding Tax Rate Interest ⓘ		1	0.57	1	1	1	0.14	
Withholding Tax Rate Royalties ⓘ		1	0.71	1	0.02	0.54	0.12	
Tax Attractiveness Index		**0.93**	**0.69**	**0.59**	**0.47**	**0.46**	**0.21**	
Rank out of 100		**1**	**9**	**15**	**33**	**34**	**97**	
		UNITED ARAB EMIRATES	SINGAPORE	NETHERLANDS	FRANCE	GERMANY	UNITED STATES	

If users have tax knowledge and are interested in individual components rather than the overall index and rank values, they can build their own index and choose between one and 20 components (figure 5). Moreover, users can choose a specific year for which the index should be displayed.

Figure 5: Building an individual index

6. Downloading Tax Attractiveness Index Data

Users can download the *Tax Attractiveness Index* data free of charge for non-commercial use. They can reach the download area via the menu item at the top, via the top menu bar. The data can be fully customized: Users can select the years, the *Tax Attractiveness Index* components and the countries of interest. Data can be downloaded, sorted by ranking, by name, or by region (figure 6).
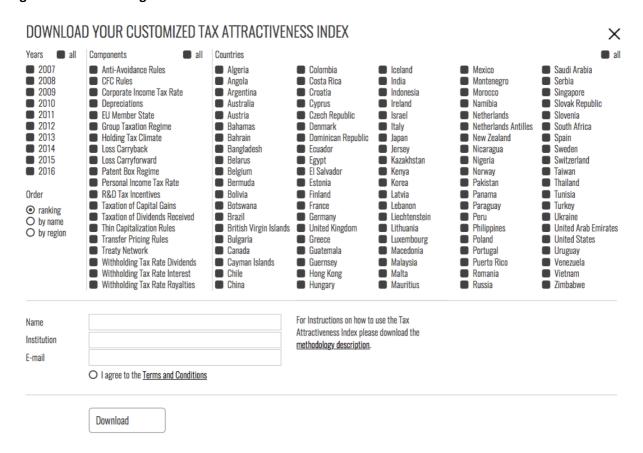
Users have to fill in their full name, their institution and their email-address, must agree to the terms and conditions (www.tax-index.org/terms-and-conditions) and can then download the data. Data may be used for scientific research and media reports (print and online), however, needs to be quoted accurately. We recommend citation as follows:

Schanz, Deborah; Keller, Sarah; Dinkel, Andreas; Fritz, Jil and Grosselfinger, Christian, The Tax Attractiveness Index: Methodology (November 2, 2017), www.tax-index.org.
Available at SSRN: https://ssrn.com/abstract=3013603

Figure 6: Downloading the data

DOWNLOAD YOUR CUSTOMIZED TAX ATTRACTIVENESS INDEX

Please inform us at info@tax-index.org about publications based on *Tax Attractiveness Index* data.

We hope that the *Tax Attractiveness Index* is valuable for you. We are interested in feedback from you: Please share your questions, critique, publications or any other related information with us at info@tax-index.org. Enjoy www.tax-index.org!