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# THE INFLUENCE OF THE TAX SYSTEM ON THE LOCATION OF HOLDING COMPANIES IN SWITZERLAND

## 1. INTRODUCTION

This article analyzes the influence of the tax system on the decision to locate a holding company in Switzerland, through the specification and estimation of an econometric model using the Ordinary Least Squares methodology (OLS).

We proposed a definition of holding company as: an intermediate company, with independent legal capability, whose purpose is to hold and manage shares of other national or foreign companies that can receive certain tax benefits if they fulfill the requirements established to that effect by the national tax laws.

Holding companies can be classified as pure holding companies and mixed holding companies. Pure holding companies are those entities whose social goal is exclusively to hold, manage, and administrate the shares of the companies in which they participate, whereas mixed or impure holding companies, in addition to possessing, managing, and administering the shares of the companies in which they participate, they can have a commercial and industrial social objective; that is, they are productive entities.

This classification is significant because in Switzerland the tax holding benefit varies whether the holding company is pure or mixed.

Holding company plays a very important role in the international tax system, not only as instruments of international tax planning, but also as vehicles to attract foreign direct investment. Foreign Direct Investment has motivated various countries, such as Austria<sup>1</sup>, Sweden<sup>2</sup>, and Denmark,<sup>3</sup> to join the competition to attract holding companies, and it explains

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<sup>1</sup> For more in-depth information on tax law for holding companies in Austria, see: Wallner, B. (2007).

<sup>2</sup> For more in-depth information on tax law for holding companies in Sweden, see: Björkeson, E. (2002).

<sup>3</sup> For more in-depth information on tax law for holding companies in Denmark, see: Hansen, A. (2000); Steenholdt, S., and Josephsen, N. (1999).

why Holland and Luxembourg<sup>4</sup> continue improving their tax laws in order to attract holding companies to their territories.

The study of holding companies as instruments of international tax planning is usually linked to law offices or consulting firms that specialize in the international tax system—not university academic research *per se*. The interaction of academic theory and international fiscal praxis provides an interesting perspective from which to approach this topic.

To develop this perspective, we first review the theoretical framework for analyzing the factors relevant to the location of foreign direct investment in order to know the variables which could influence to attract holding companies.

Second, we specify an econometric model in two phases: estimation and definitive model. In the estimation phase, we present different econometric models, attending only to the influence of different fiscal elements. Once we have selected the best model from the fiscal point of view, we incorporate the other, non-fiscal factors that the study framework shows to be relevant in choosing the location of holding firms. We present the definitive model (including the respective individual and joint analyses to determine the model's goodness of fit).

Finally, result and conclusion. This model shows that there are other variables (qualitative) in addition to the tax system that have the same level of influence in determining the establishment of holding companies in Switzerland.

## **2. THEORETICAL FRAMEWORK**

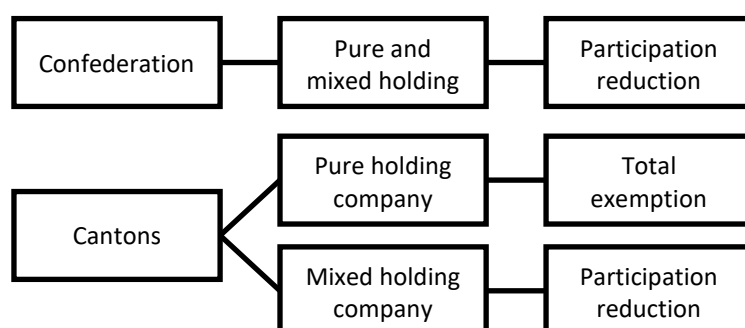
The Swiss tax system is a reflection of the country's federal system. The taxation of holding companies thus has two sovereign levels: first, the confederation, second, the cantons and municipalities.

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<sup>4</sup> An interesting study of international tax planning through Luxembourg may be found in: Warner, P., and Schmitz, M. (2004).

As the figure 1 describes, federal tax regulations grant holding companies, pure or mixed, a tax benefit called participation reduction, which consists of a tax reduction proportional to the profits generated by the foreign or national participations. The cantonal tax regulation distinguishes tax benefits granted to holding companies depending on whether they are pure or mixed. A pure holding company is completely exempt from paying tax on profit, and a mixed holding company can apply the method of participation reduction in paying the tax on its profit.

Figure 1. Tax regimes applicable to holding companies in Switzerland.



Source: Developed by the authors

In this article we analyze, specially, the mixed holding companies applying the benefit of participation reduction<sup>5</sup>.

As mixed holding companies as pure holding companies are carriers of foreign direct investment. That is the reason we have made use of the theories that explain foreign direct investment as theoretical support for the variables used in the development of the econometric model.

<sup>5</sup> It is important to note that the benefit of participation reduction is, according to Widmer (2002), mistakenly classified as holding privilege.

Dunning (2008) in his book “Multinational Enterprises and the Global Economy” make reference to Jack Behrman (1972) and his classification about the types of foreign production by multinational enterprises. Behrman and Dunning identify four types of multinational enterprises activities:

1. natural resource seekers;
2. market seekers;
3. efficiency seekers; and
4. strategic asset or capability seekers.

The decision of a Multinational Enterprise to invest abroad is based on one or more than one of the activities listed above. In our study we consider holding companies separately. On the one hand, pure holding companies we can include within “Efficiency seekers (economic efficiency, tax efficiency)” as type of Multinational Enterprise activities to invest abroad, and the other hand, mixed holding companies can be classify in more than one type of Multinational Enterprises activities depending of the goal or productive activity of the company.

According to Dunning (2008) the motivation of efficiency-seeking “is to rationalize the structure of established resource-based or market-seeking investment in such a way that the investing company can gain from the common governance of geographically dispersed activities”. The definition of holding company is based in the common governance of a group of companies, geographically disperses, developing same activities or not in order to diversify the risk.

The decision to locate a holding company in a country depend of different factors such as micro and macro policies of governments (i.e. tax policies, market structures, labour regulations) or social or political factors (i.e. languages, political stability, infrastructure and so on) and these variables are within “the efficiency seekers” as motivation for investing abroad. Hence, we

consider that the main motivation to locate a holding company in a foreign country is “the efficiency seekers”.

However, we should identify other mixed holding companies whose aim is to acquire the assets of foreign enterprises in order to establish in an unfamiliar market or as business planning strategic. So, this kind of holding companies can be framed within “market seekers” or “strategic asset seekers”.

Other motive for multinational enterprises activity which we consider important for holding company is which Dunning (2008) called “Escape Investments”. This motive describes how Multinational Enterprises escape from restrictive legislation or macro-organisational policies or high level of taxation of their home country. Multinational Enterprises decide to relocate their business in countries with easily “doing business”. This motivation explain clearly the situation related with the decision to locate holding company, from a high level of taxation’s countries to a country with low level of taxation or with special tax treatment for this type of companies.

To sum up, according to the Behrman and Dunning types of multinational enterprises activities, we can argue that holding company generally is framed within “efficiency seeker” and “escape investment”.

Once, we frame holding companies within these types of categories to explain the determinants of foreign investment, we are be able to analyze the theories and paradigms to have explained the foreign direct investment, regarding the decision to locate a holding company in a foreign country .

In our case is remarkable the theory of international resource allocation because it try to answer the question: “Why do firms locate their activities in one country rather than another?” based in “the special distribution of factor endowments and capabilities” (Dunning, 2008).

However, we are going to do a review for the leading theories and paradigms to explain the foreign direct investment, always regarding the location as key factor for multinational activities.

Hymer (1960, 1968) and Vernon (1966), both explain the foreign direct investment of multinational focusing more in the ownership advantage than location advantage. Vernon “used a microeconomic concept – the product cycle- to help explain a macroeconomic phenomenon, namely, the foreign activities of US MNEs in the post-war period” (Dunning, 2008). The product cycle model of Vernon did not explain efficiency-seeking as category of multinational activity which we frame a holding company.

Like Hymer and Vernon, other economist such as Johnson (1970), Swedenborg (1979), Calvet (1980), Owen (1982) and Kumar (1990) among other, explain the foreign direct investment of multinational based on ownership advantage.

It is not until Lessard (1976, 1982), Rugman (1976, 1977, 1979) and Agmon and Lessard (1977), when the theories of foreign direct investment focusing on the location advantage. They evaluate the risk or advantages of risk diversification. It involves a geographical distribution of their asset as efficiency strategic. Holding companies distribute geographically their assets and activities in order to diversify the risk and to obtain more effectiveness in their business.

It is important to point for our study the theory of the Uppsala school of Johanson and Vahlne (1977, 1990) because they include some variables to take into account at the moment to invest abroad, such as the levels of economic development, education, culture and languages. These factors have been taken into account in our study and included in our econometric model. This theory focusing in the market and efficiency-seeking to explain the foreign direct investment.

Subsequently, the internationalization theory of the multinational activities by a group of Swedish, Canadian, British and US economist was formulated. This theory explain “why the

cross-border transactions of intermediate products are organized by hierarchies rather than determined by market forces” (Dunning, 2008). Hence, for our study-case is not especially relevant.

The Eclectic or OLI Paradigm developed by Dunning explains foreign direct investment by three conditions:

1. Ownership-specific Advantage (O) of an Enterprise of one Nationality over Those of Another
2. Location-specific Factors
3. Internalisation Advantages.

Dunning (2008) said that the explanation of foreign direct investment depend of the interaction of the three condition above mentioned, however, dunning also mentioned that “OLI Paradigm component may be interdependent of one another”. For our study we have taken into account, separately, the Location (L) Advantage in order to include appropriate variables in our econometric model.

In our paper we attempt to analyze the enterprise’s decision to set up a holding company in a specific location. The OLI Paradigm gives us the relevant factor that a Multinational Enterprise taken into account at the moment to choose the location to invest. These factors are listed in the table 1.

Dunning (2008) show some variables as location advantages (L) such as: international transport and communication cost, investment incentives and disincentives, infrastructure provision (educational, transport and communication), language, cultural, business, political differences, legal and regulatory system.

All these factor are relevant for our study because the decision to set up a holding company in a specific location will be made once all the factors have been analyzed, included the tax system.



The second figure in the table 1, the World Investment Report from UNCTAD (2011) shows other factors that influence the location of foreign direct investment. It is remarkable to point that within political framework section is fiscal policy as variable to take into account to invest in a specific country. Hence, in theory tax system is a main variable to determine the location of holding companies.

Table 1. Table summarizing the variables that influence the location of foreign direct investment.<sup>6 7</sup>

Dunning & Lundan (2008)	World Investment Report UNCTAD (2011)
<ul style="list-style-type: none"> <li>• OWNERSHIP ADVANTAGES <ul style="list-style-type: none"> <li>• Regulation of intellectual property</li> <li>• Levels of technology</li> <li>• Levels of knowledge of business management techniques</li> <li>• Investment in R&amp;D</li> </ul> </li> <li>• INTERNALIZATION ADVANTAGES <ul style="list-style-type: none"> <li>• No price discrimination</li> <li>• Market control</li> <li>• Low transaction cost</li> </ul> </li> <li>• LOCATION ADVANTAGES <ul style="list-style-type: none"> <li>• Fiscal incentives</li> <li>• Subsidies</li> <li>• Cost of labor</li> <li>• Government policies on imports, exports and competition</li> <li>• Favorable environment for "doing business"</li> <li>• Local incentives</li> <li>• Aid to foreign investors</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• POLITICAL FRAMEWORK <ul style="list-style-type: none"> <li>• Economic, political and social stability</li> <li>• Competition policy</li> <li>• Market policy</li> <li>• Fiscal policy</li> </ul> </li> <li>• EASE OF DOING BUSINESS <ul style="list-style-type: none"> <li>• Cost reduction for doing business</li> </ul> </li> <li>• ECONOMIC VARIABLE <ul style="list-style-type: none"> <li>• Infrastructure</li> <li>• Size of market and per capita income</li> <li>• Market growth</li> <li>• Access to global and regional market</li> <li>• Local consumer preferences</li> <li>• Access to raw material</li> <li>• Access to low-cost labor</li> <li>• Access to qualified labor</li> <li>• Cost and productivity of resources/assets</li> <li>• Other costs (transportation, communication, energy)</li> </ul> </li> </ul>

Source: Developed by the authors from information provided in reference books

The academic framework includes very few empirical studies that show the degree of influence of the tax system on the decision of where to locate a holding company. There are, however, a

<sup>6</sup> According to Rodríguez Ondarza, J., in 1990, the Commission of the European Union commissioned a report from Arthur Andersen to provide a comparative study of the fiscal and social burden sustained by a company in the European Union, the United States, and Japan; and an analysis of the factors that influence the location of investment. This report held that, although tax burden influences the decision to invest in a country, it is not the only factor to take into account. The report includes a series of elements that have the same or more importance than the tax system.

<sup>7</sup> In its annual publication on foreign direct investment, this organism indicates that the determining factors for the location of multinationals and ultimately for foreign direct investment can be classified into three groups: a political framework, or the country's policies or policy framework; business facilitation, and economic conditions or economic environment.

significant number of descriptive theories which indicates the fiscal variable as decisive in where to locate a holding company, we believe it is important to highlight the following

Table 2. Table summarizing the variables that influence the location of holding companies.

Romano (1999)	Udal & Cinnamon (2004)	Mongal & Johal (2005)	Eynatten (2007)	Eicke (2009)
<ul style="list-style-type: none"> <li>• Fiscal and non-fiscal factors, such as: <ul style="list-style-type: none"> <li>• Political stability</li> <li>• Flexible legislation</li> <li>• Strong currency</li> <li>• Efficient public services</li> <li>• Good telecommunications network</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Financial and economic infrastructure</li> <li>• Legal and political stability</li> <li>• Labor and business regulation</li> <li>• Accounting regulations</li> <li>• Tax system</li> <li>• Human resources, language and culture</li> <li>• Availability of material and financial aid (infrastructure, buildings, and subsidies)</li> </ul>	<ul style="list-style-type: none"> <li>• Tax system</li> <li>• Economic and political stability</li> <li>• Absence of foreign exchange restrictions</li> <li>• Minimal bureaucratic interference</li> <li>• Effective infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Exemption of dividends and capital gains</li> <li>• Low or no withholding tax on inbound and outbound dividends, as well as on profits from liquidation</li> <li>• Absence of tax on capital</li> <li>• Absence of tax on stock transfer</li> <li>• Unlimited deduction on financial expenses</li> <li>• Limited anti-avoidance legislation</li> <li>• Absence of CFC rules</li> <li>• Excellent network of double taxation agreements</li> <li>• Low corporate tax rate</li> </ul>	<ul style="list-style-type: none"> <li>• Participation exemption on dividends and capital gains</li> <li>• No withholding tax on dividends and profits from liquidation</li> <li>• Deductibility of financial costs, goodwill, and depreciation per value of the participation</li> <li>• Limited anti-avoidance legislation</li> <li>• Liberal thin-capitalization rules</li> <li>• No regulation of international fiscal transparency</li> <li>• Excellent network of double taxation agreements</li> <li>• No tax on capital</li> <li>• Low corporate tax rate</li> <li>• Low tax burden on workers</li> <li>• Attractive investment climate</li> <li>• No exit taxes</li> </ul>

Source: Developed by the authors from information provided in reference books

As Romano (1999), Udal & Cinnamon (2004), Mongal & Johal (2005) include in general way, the tax system as an important variable to take into account to locate a holding company in a specific jurisdiction. At the same level as fiscal variable they mention other types of factor such as: political variables (political stability,) economic variables (strong currency, economic stability, absence of foreign exchange restrictions, among others), legal factors (labor and business regulations, flexible legislation), social variables (human resources, language and culture). Whereas Eynatten (2007) and Eicke (2009) focusing in specific fiscal factors to influence in holding companies. They are going into more details about the tax legal regulation applying to holding company in a specific tax jurisdiction. Both author mention factor such as: exemption of dividend and capital gain from a subsidiary of holding company, low or no

withholding tax on inbound and outbound dividends, no regulation of international fiscal transparency (CFC rules or thin capitalization rules), low corporate tax rate, and so on.

So far, we have been presenting the theories to attempt to explain the location of the foreign direct investment and the factors to take into account to invest in a specific country. As well we have revised some studies which indicate some fiscal factor as important to locate a holding company in a tax jurisdiction. It is important to say that all these studies and theories served as a reference for choosing the variables to use in specifying the econometric model we will now present.

### **3. SPECIFICATION OF THE ECONOMETRIC MODEL**

We analyze the influence of the tax system on the location of a holding company in Switzerland by estimating a cross-sectional model using the Ordinary Least Squares methodology (OLS). We justify this technique because the tax rate on the net benefit has remained constant for holding companies at the federal level since 1999 (8.5% established in the Federal Constitution). This fact limits the application of econometric techniques in a specific timeframe, such as panel data and time series analysis. Further, the availability of statistical information differentiated by canton served as the basis for the analysis performed using the application of a cross-sectional econometric model.

Along these lines, the Swiss Federation has three tax jurisdictions: federal, cantonal, and municipal level. Thus, the fiscal variables differ across cantons in Switzerland, and there is intercantonal fiscal competition for cantons to attract holding companies to their territories. Further, the comparative effect derived from the existence of some cantons with a tradition of hosting holding companies can only be quantified through the methodology proposed.

In specifying the model, we used statistical information from different sources. Among the databases consulted are the Swiss Federal Statistics Office,<sup>8</sup> BAKBASEL Economics,<sup>9</sup> and the Administration Fédéral des Contributions (AFS).<sup>10</sup> We also used international databases, such as the OCDE iLibrary,<sup>11</sup> World Bank,<sup>12</sup> Euromonitor: Passport,<sup>13</sup> Eurostat,<sup>14</sup> and SABI.<sup>15</sup>

We selected the explanatory variables from examination of the theoretical framework and the empirical literature consulted, including both factors that influence the location of holding companies directly and elements that influence the attraction of foreign direct investment through productive companies, since the holding companies can be mixed in character. Table 3 shows the variables used in the different specifications performed to analyze the influence of the tax system on the decision to locate a holding company in Switzerland.

Table 3. Variables used in the model.

Type	Abbreviation	Description	Measurement	Source of Statistical Information
Endogenous	HOLDING_SWITZ	Holding companies in Switzerland	Percentage of holding companies relative to the total number of companies established in each canton	Developed by the authors from each canton's Registries of Commerce
Exogenous	BURDEN_TAX	Global tax burden on the net benefit and capital	Percentual terms	Administration Fédérale des Contributions AFC <sup>16</sup>
Exogenous	BAK_TAXATION_INDEX	BAK Taxation Index for companies	Percentual terms	BAKBASEL <sup>17</sup>
Exogenous	FISCAL_POTENTIAL	Exploitation index of fiscal potential	Points	Swiss Statistics Office <sup>18</sup>

<sup>8</sup> <http://www.bfs.admin.ch/bfs/portal/fr/index.html>

<sup>9</sup> <http://www.bakbasel.ch/indexW3DnavidW261010000.shtml>

<http://www.wirtschaftsatlas.bakbasel.com/wirtschaftsatlas.html>

<sup>10</sup> <http://www.estv.admin.ch/dokumentation/00075/00076/00720/index.html?lang=fr>

<sup>11</sup> <http://www.oecd-ilibrary.org/statistics;jsessionid=1wh43qy4bjfwy.delta>

<sup>12</sup> <http://data.worldbank.org/>

<sup>13</sup> <http://www.portal.euromonitor.com/Portal/Pages/Magazine/WelcomePage.aspx>

<sup>14</sup> <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes>

<sup>15</sup> <http://sabi.bvdep.com/version-20121016/cgi/template.dll>

<sup>16</sup> <http://www.estv.admin.ch/dokumentation/00075/00076/00720/01204/index.html?lang=fr>

<sup>17</sup> <http://www.bakbasel.ch/indexW3DnavidW261010000.shtml>

<sup>18</sup> [http://www.bfs.admin.ch/bfs/portal/fr/index/themen/18/02/blank/key/steuerbelastung\\_kantone.html](http://www.bfs.admin.ch/bfs/portal/fr/index/themen/18/02/blank/key/steuerbelastung_kantone.html)

Exogenous	ZOUG	Dummy variable	Values 0 and 1	Developed by the authors
Exogenous	NIDWALD	Dummy variable	Values 0 and 1	Developed by the authors

Source: Developed by the authors

The time frame of the econometric model applied is the year 2010, since this is the last time period for which the information was updated when we concluded this research. The number of cantons analyzed is 19, as the BAKBASEL report analyzes only 19 cantons, considering the rest not to be attractive for locating holding companies. The sample used in this research thus includes a total of 114 items.

### 3.1 Analysis of the variables

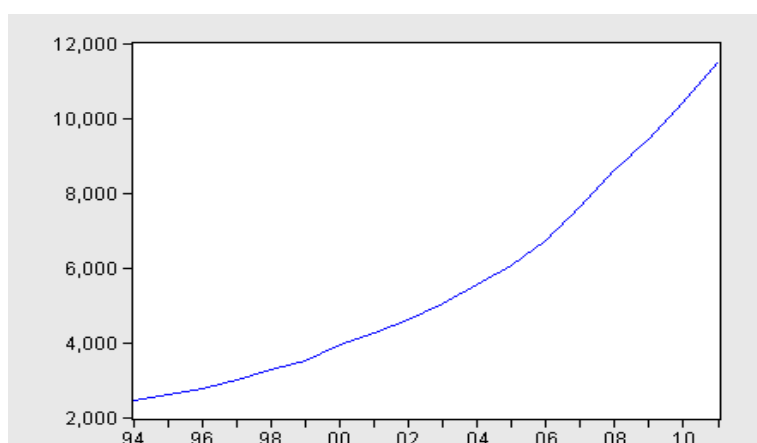
#### 3.1.1. Dependent or endogenous variable:

The database used to analyze the dependent variable comes from a primary information source, as it was constructed from the different Commercial Registries of each canton. We should point out that the Federal Statistics Office considers the number of holding companies established in each canton to be a secret statistic.

The methodology used to calculate the number of holding companies recorded in each cantonal registry was based on the express presence of the term “holding” in the company’s corporate name. This methodology underestimates the true value of the universe, since it does not include companies whose social purpose is that of a holding company but that do not use the term “holding” in their corporate name. Further, it is important to indicate that the calculation of the number of holding companies established in Switzerland includes both pure and mixed holding companies.

The minimum total number of active holding companies in Switzerland during the period 1994-2010 is shown in the following figure:

Figure 2. Evolution of the number of holding companies in Switzerland. Period 1994-2011.

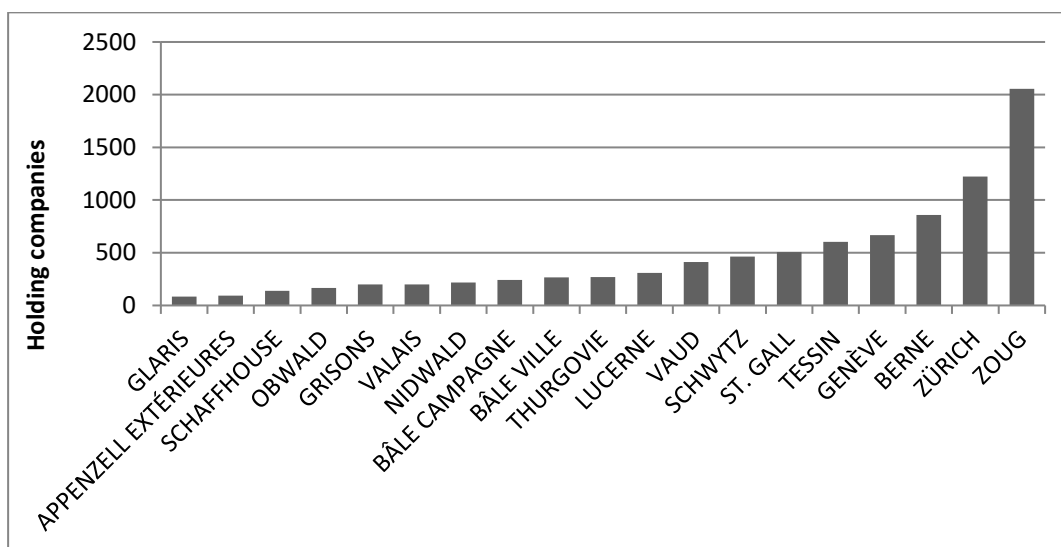


Source: Developed by the authors from the Commercial Registries of each canton

As seen in Figure 2, the total number of holding companies in Switzerland shows exponential growth during the period 1994-2011, at an average interannual rate of 9%, with the country's high degree of economic freedom being a first-order explanatory element.

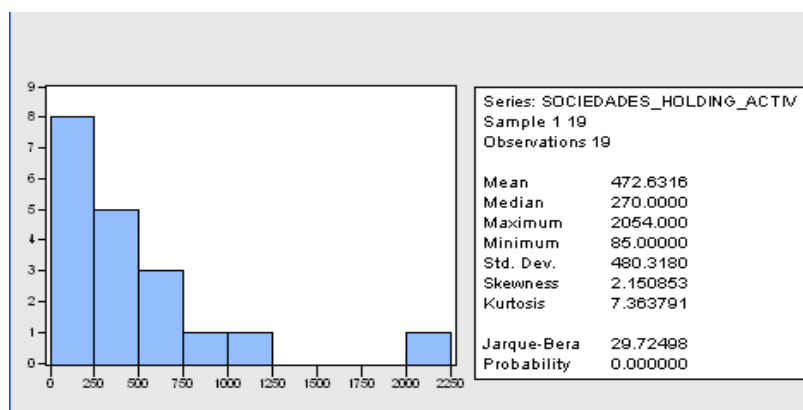
As to the spatial and time coordinates of our analysis, we will now present the number of holding companies per canton and the corresponding descriptive statistics included in the dependent variable used in this research.

Figure 3. Number of holding companies by canton. Year 2010.



Source: Developed by the authors from the Commercial Registries of each canton

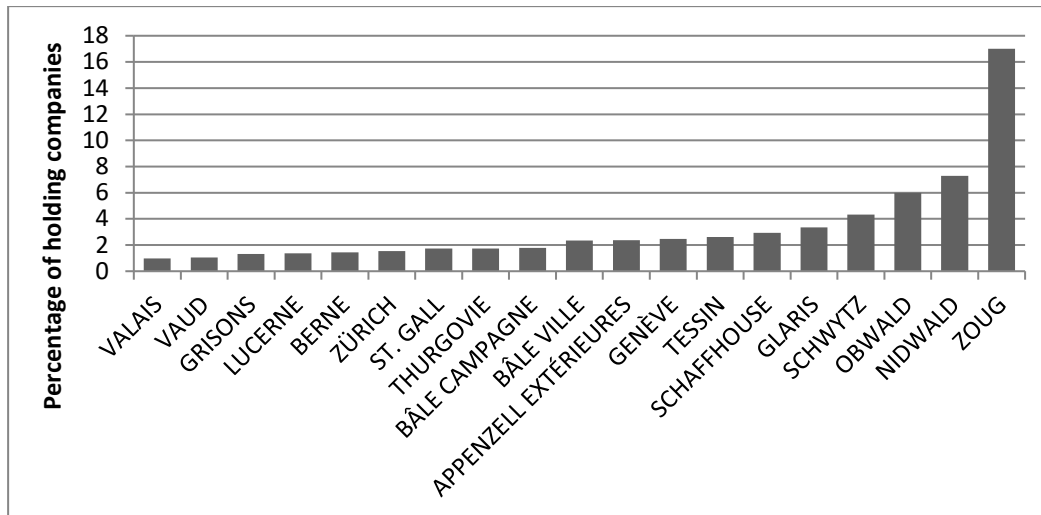
Figure 4. Number of holding companies by cantons. Descriptive statistics. 2010.



Source: Developed by the authors

From Figures 3 and 4, we see that the variable “Number of holding companies” shows an asymmetrical distribution and a wide range or trajectory of cantons. The maximum value, with 2054 companies, corresponds to the canton of Zoug, whereas Glaris has the lowest number of holding companies (85). Given this high dispersion (480), we relativized the variable with respect to the total number of companies established in each canton, in order to reduce the wide trajectory initially shown and thus to minimize the risk of the model not fulfilling the hypothesis of residual homoscedasticity (See Figure 5).

Figure 5. Percentage of holding companies relative to the total number of companies established in each canton. Year 2010.



Source: Developed by the authors from the Commercial Registries of each canton

After applying the transformation indicated, we reduce the initial dispersion of the variable, which reveals a theoretically familiar situation when we see that Zoug, Nidwald, Obwald, and Schwytz are the cantons with the highest percentage of holding companies. They are also the cantons with the greatest fiscal tradition of locating of holding companies in Switzerland.

### 3.1.2. Independent or exogenous variables:

In the specification phase, we considered, first, the influence that different fiscal elements have on the location of holding companies. After choosing the best model from this perspective, we incorporated the other factors. The following provides a detailed description of the different conditioning factors considered to be relevant from the fiscal point of view.

#### A. Fiscal variables:

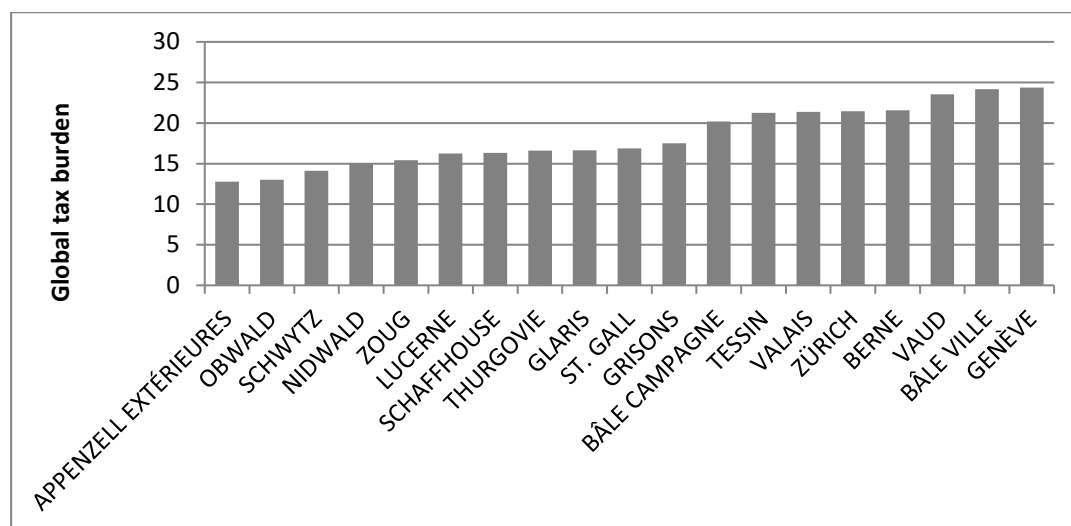
##### 1. Global tax burden on the net benefit and on capital (TAX BURDEN):

This variable includes the tax burden on the net benefit and capital that a commercial, industrial, or banking company must assume, without either participations or any reduction of the legal rate. The legal rate of the tax on the net benefit is a determining influence on the location of a



holding company, since profits that are not exempt through participation reductions are taxed under the ordinary regime—in Switzerland, 8.5% at the federal level, plus the cantonal and municipal tax, a rate in any case lower than that of the surrounding European countries.

Figure 6. Global tax burden on net profit and capital in each canton. Year 2010.



Source: Administration Fédérale des Contributions AFC

Figure 6 shows that the four most attractive cantons for the location of holding companies (Zoug, Nidwald, Obwald, and Schwytz) have a smaller tax burden. We should point out that, in 2010, the canton of Appenzell Extérieure reduced its tax burden with the intention of entering the fiscal competition to attract companies to its territory.

## 2. BAK Taxation Index for companies (BAK TAXATION INDEX):

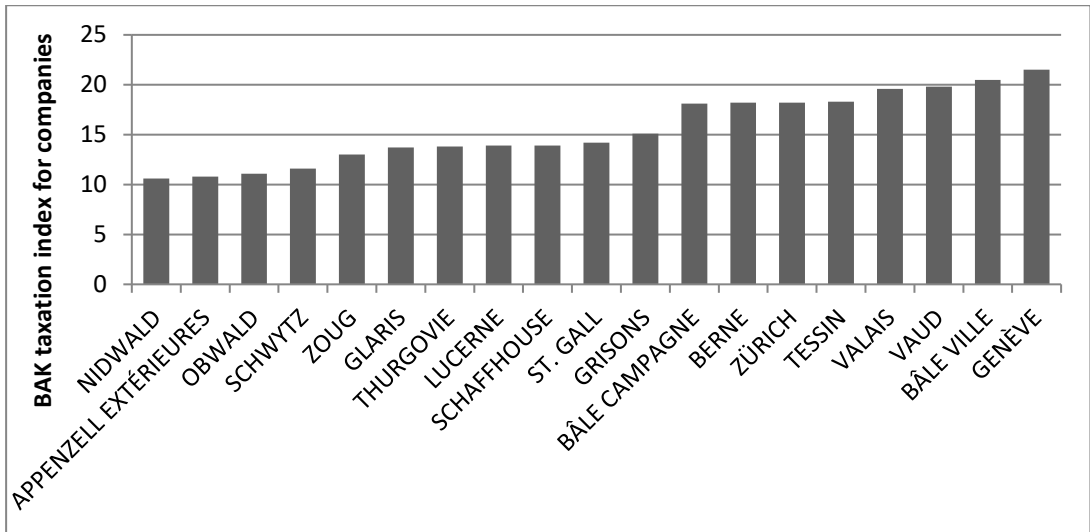
Measures the tax burden of companies, including all relevant taxes levied on a firm, as well as the regulations that influence calculation of the tax base, such as those governing amortization.

The legal rate used for calculating the business tax burden is the effective average tax rate.

In contrast to the previous variable (global tax burden on net benefit and capital), the BAK Taxation Index for companies takes into account the effective average tax rate levied on a

company in Switzerland, and is thus closer to the real tax burden borne by the companies established in Switzerland. We also see that Zoug, Nidwald, Obwald, and Schwytz—the traditional cantons that host holding companies—are those that have a lower tax burden.

Figure 7. BAK Taxation Index for companies in each canton. Year 2010.

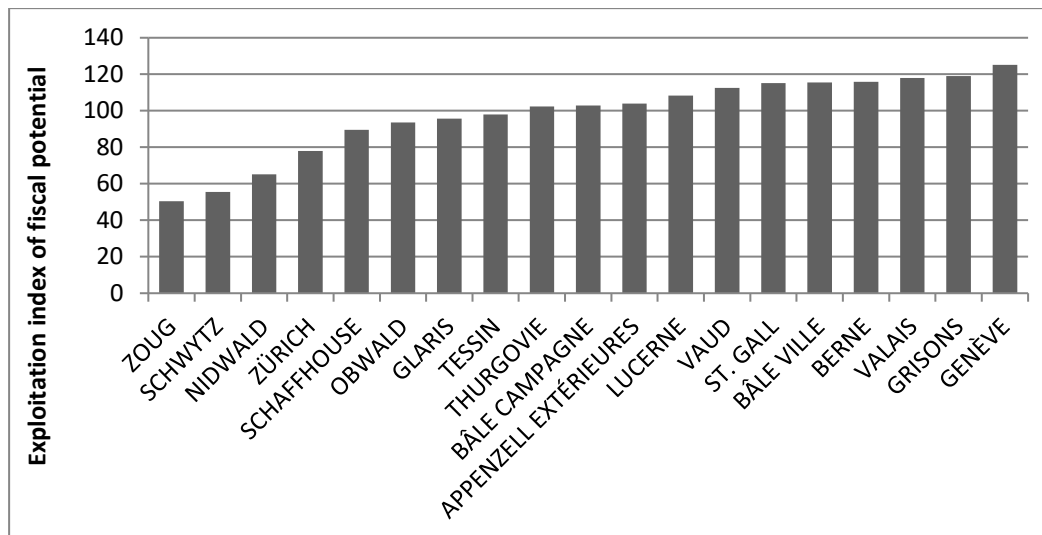


Source: BAKBASEL

### 3. Exploitation Index of Tax Potential (TAX\_POTENTIAL):

This index constitutes the relationship between the tax revenues in a canton (including its municipality) and the potential resources that exist in the canton. They express the fiscally exploitable value, since the index involves determining the taxable resources of a canton and inferring its tax burden. The average value of the index for the set of cantons constitutes the base. Thus, cantons with values higher than 100 in the index will show an above-average exploitation index and vice versa.

Figure 8. Exploitation index of fiscal potential for the cantons. Year 2010.



Source: Swiss Statistics Office

As Figure 8 shows, Zoug, Schwytz, and Nidwald are the cantons with lower tax burdens, as well as the cantons that have traditionally received holding companies and thus also that possess special qualitative elements that differentiate them from the other cantons.

## B. Other variables: qualitative variables:

### 1. Nidwald and Zoug:

As indicated above, the cantons Nidwald and Zoug have the highest number of holding companies relative to the total percentage of companies established. Zoug, with 2054 holding companies, represents 16.66% of the total of firms established. Nidwald, with 217 holding companies, represents 7.28% of the total number of firms constituted in its canton. These cantons are considered to be the most attractive for locating pure and mixed holding companies. Along these lines, Eicke (2011, p. 793) argues that, “when one debates a home for a multinational company in Europe, Zoug should be first on the list.”

It is important to point out the battery of qualitative factors that encourage the attractiveness of these cantons for locating holding companies. These include facilitation of communication with the cantonal Tax Authority, absence of bureaucracy, experience of personnel of the cantonal

Tax Authority in dealing with this kind of taxpayer, geographical proximity to Zurich and its international airport, quality of public services, international schools, transparent legal system, previous presence of holding companies, tradition, aid provided for obtaining work permits for foreigners, and favorable tax regulations for a specific kind of company, such as headquarters, auxiliary,<sup>19</sup> or domiciliary companies, among others.

### 3.2. Estimation of the econometric model

#### 3.2.1. Partial models

Equation 1 shows the specification of the different models, using in each only the explanatory fiscal variables

$$Y_i = \beta_0 + \beta_1 X_{1i} + \varepsilon_i \quad (1)$$

where:

$Y_i$  represents the value of the endogenous variable in canton  $i$  in 2010, that is, corresponds to the percentage of holding companies relative to the total number of companies established in each canton.

$X_{1i}$  constitutes each of the quantitative fiscal variables obtained for each of the cantons.

$\varepsilon_i$  represents the value of the variable of error corresponding to canton  $i$ , with an average of zero, constant variance, and no self-correlation.

The results for each of the models estimated are shown in Table 4.

Table 4. Effects of the fiscal variables on location of holding companies in Switzerland. Year 2010.

Variables	Estimations
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<sup>19</sup> See Burki, N., and Reinartz, P. (1996). The Taxation of Holding, Domiciliary and Auxiliary Companies in Switzerland. Bulletin for International Fiscal Documentation, 8 (50), 351-358.

	<b>Model I</b>	<b>Model II</b>	<b>Model III</b>
CONSTANT	10.69 (0.02)	10.32 (0.01)	15.53 (0.00)
BURDEN_TAX	-0.40 (0.08)		
BAK_TAXATION_INDEX		-0.44 (0.06)	
FISCAL_POTENTIAL			-0.12 (0.00)
<b>Statistics</b>			
R <sup>2</sup>	0.16	0.18	0.53
Adjusted R <sup>2</sup>	0.11	0.13	0.50
F-statistic	3.32 (0.08)	3.81 (0.06)	19.46 (0.00)
Durbin-Watson	1.99	2.04	2.32

Source: Developed by the authors from results obtained after estimating each of the models

In analyzing the validity of the parameters in each of the estimations, we find that all of the coefficients associated with the independent fiscal variables show the relation expected *a priori*. As to the statistical analysis, both the variable of global tax burden on the net benefit and capital (Tax\_Burden) and the BAK Taxation Index for companies (Bak\_Taxation\_Index) were statistically different from zero, with a confidence level of 90%. In contrast, the variable Exploitation Index for Fiscal Potential (Tax\_Potential) was different from zero, with 95% confidence.

If we examine the model's overall goodness of fit, the determination coefficient for Model III has a value over 50%, whereas Models I and II show values between 11% and 18%, respectively. However, when analyzing the Durbin-Watson statistic should be noted that the value obtained in the estimation III is near to the boundary of the area with negative autocorrelation, unlike the model I and II, whose values are located about 2 (a fact which implies no autocorrelation in the residuals). Taking into consideration the aspect mentioned, as

well as the high degree of correlation between these variables (Table 5) and the fact that the BAK Taxation Index for companies uses the effective average tax rate as a unit of measurement, we chose the estimation in Column II of Table 4 as the starting point for the definitive specification, since this estimation takes the BAK Taxation Index for companies as an independent variable.

Table 5. Correlation matrix for the fiscal variables.

	<b>BURDEN_TAX</b>	<b>BAK_TAXATION_INDEX</b>	<b>FISCAL_POTENTIAL</b>
<b>BURDEN_TAX</b>	1.00	0.98	0.52
<b>BAK_TAXATION_INDEX</b>	0.98	1.00	0.57
<b>FISCAL_POTENTIAL</b>	0.52	0.57	1.00

Source: Developed by the authors

Thus, a greater nominal rate on the variable tax burden means a higher percentage in the BAK\_TAXATION\_INDEX—an increase of almost one point—since both variables reflect the tax burden on companies located in Switzerland, differing only in that the first uses the nominal rate as a measure, while the others use the legal average effective tax rate.

The relationship of the global tax burden on the net benefit for each canton and the cantonal exploitation index of fiscal potential takes a positive sign. This result indicates that, as the tax burden increases, the exploitation index of fiscal potential also increases. The effect is due to the fact that both variables measure the tax burden borne by companies established in Switzerland even when each variable has taken into account different elements. (The variable tax burden takes into account the nominal rate, whereas the variable exploitation index of fiscal potential takes into account the cantonal tax revenue and the tax resources.) In the same way, we can explain the relationship between the variable BAK\_TAXATION\_INDEX and the exploitation index of fiscal potential.

### 3.2.2. Definitive econometric model

To complete the specification of the model, we included in the model (II) two dichotomous variables, in order to quantify the effect of the location of holding companies in the cantons of Zoug and Nidwald. Equation 2 presents the definitive specification,

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_1 D_{1i} + \beta_1 D_{2i} + \varepsilon_i \quad (2)$$

where:

$Y_i$  represents the percentage of holding companies (HOLDING\_SUIZA ) relative to the total number of companies established in each canton in 2010.

$X_{1i}$  constitutes each of the quantitative fiscal variables (BAK\_TAXATION\_INDEX) obtained for each of the cantons.

$D_{1i}$  and  $D_{2i}$  correspond to the two dummy variables, which take the value of 1 in the case of ZOUG and NIDWALD, and 0 for the other cases.

Again,  $\varepsilon_i$  assumes the value of the error corresponding to canton  $i$ , with an average of 0, constant variance, and no self-correlation.

## 4. RESULTS AND CONCLUSIONS

We will now present the results of the cross-sectional model that obtained the best fit to explain the location of holding companies in Switzerland:

Table 6. Correlation matrix for the fiscal variables.

Variable	Coefficient	Std.Error	t-statistic	Significance level
Constant	5.5427	1.3345	4.1532	0.0008
BAK_TAXATION_INDEX	-0.2014	0.0815	-2.4705	0.0260
ZOUG	14.0756	1.1847	11.8814	0.0000
NIDWALD	3.8797	1.2402	3.1282	0.0069

R <sup>2</sup>	0.9229			
Adjusted R <sup>2</sup>	0.9074			
F-statistic	59.852			
Durbin-Watson	2.023			

Source: Developed by the authors

The coefficients linked to the different variables used in the model again show the signs expected and are statistically significant. In the case of the tax variables, as the BAK\_TAXATION\_INDEX for companies increases one percentage point, the percentage of holding companies in the different Swiss cantons decreases by 0.2%. In contrast, the variables of ZOUG and NIDWALD maintain a positive relationship to the variable HOLDING\_SWITZERLAND, that is, 14.07% and 3.87% more holding companies, respectively, due to the level of attractiveness these cantons possess. Further, incorporating the variables Zoug and Nidwald produces an increase of 74% in the explained variance, raising the value of the determination coefficient to over 92%. This conclusion is complemented by the significance level of the F-statistic.

The definitive cross-sectional econometric model with Ordinary Least Squares (for 2010) that we use shows that the tax system in Switzerland clearly influences the location of the holding companies and that two cantons (Zoug and Nidwald) in particular attract this kind of company due to qualitative factors.

In the final model developed, we have taken into consideration only the explanatory fiscal variable from the BAK Taxation Index on companies, as this variable measures the tax burden relative to the effective average rate. This variable is negative in sign, implying that, when the index increases one point, the percentage of holding companies decreases 0.20%. This means



that, the greater the tax burden, the lower the percentage of holding companies, relative to the total number of companies constituted.

We have, in turn, included two qualitative variables that explain the effect of a holding company constituted in the canton of Zoug or Nidwald, since these are the two most influential cantons in material for locating holding societies in Switzerland.

In this case, the definitive econometric model established that there would be 14% more holding companies established in Zoug, relative to the total number of companies constituted and as compared with other cantons. For the case of Nidwald, there would be 3% more holding companies in the same direction.

The definitive econometric model in which we included the tax variable (BAK\_TAXATION\_IDEX) and the qualitative variables (Zoug and Nidwald) show an R2 of 92%. Thus, the cross-sectional econometric model using Ordinary Least Squares employed for the case of Switzerland consistently explains that the tax system influences the location of companies in Switzerland decisively. We thus confirm the qualitative difference in the cantons of Zoug and Nidwald to attract holding companies to their territories.

As we have mentioned, qualitative factors that influence for location of a holding company are fiscal tradition and fiscal infrastructure.

In Switzerland, cantons such as Zoug, Nidwald, Obwald, and Schwytz have a fiscal tradition and infrastructure to attract holding companies to their jurisdiction. In these cantons there is a cluster of holding companies that have the effect of attracting more holding companies to their territories. As well, they not only have specialized offices that manage the holding companies, but the Tax Authority itself has the experience and knowledge needed to handle this kind of company. They even have offices for fiscal promotion, whose tax solutions to the questions proposed and offices for fiscal promotions can have *erga omnes* effects prior to establishing the holding company in the canton.

These factors of fiscal tradition and infrastructure can work to the detriment of other cantons that wish to enter into the tax competition, as is the case of Lucerne or Schaffhouse, which reduced their tax burden in order to attract mixed and pure holding companies but lack this fiscal infrastructure.

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