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Effective Labor Taxation and the International Location of Headquarters

Abstract

Profit taxes are widely acknowledged to influence the location of firms' headquarters. This paper sheds light on the role of aspects of labor taxation for the international location of headquarters. While profit taxes can be avoided in various ways, it is much harder for firms to manipulate the firm-specific labor tax base so that they may be relatively important for firm location. We construct a unique data set of effective labor taxes in 120 countries and use data on the location of 35,206 firms to analyze the impact of labor income tax rates, the progressivity of the income tax schedule, and social security contributions on firms' decisions where to locate their headquarters. The findings suggest that both a higher progressivity of the tax system and higher (employee- and employer-borne) social security contributions negatively influence a country's attractiveness for headquarters location. A one percentage point increase in a country's average labor income tax rate reduces its probability to be chosen as the headquarters location for the average firm by about 0.023 percentage points.

JEL-Code: H240, C250.

Keywords: labor taxation, headquarters, location choice, nested logit.

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1 Introduction

The taxation of profits and capital as an impediment to the location (and extent) of investment received much attention in theoretical as well as empirical academic work in public finance (see, e.g., Devereux and Griffith, 1998; Devereux and Hubbard, 2003). The focus on profit taxation flows from the assumption of capital to be relatively mobile across international borders, at least in comparison to other production factors such as labor. Empirical work, however, points to three issues suggesting that an emphasis on *profit taxation* may be insufficient: (i) capital and skilled workers have been conjectured and found to be largely complementary in production (see Griliches, 1969; Duffy, Papageorgiou, and Perez-Sebastian, 2004); (ii) skilled workers and employees – such as managers, technicians, and researchers – are relatively mobile across international borders (see Chiswick, 1999; Liebig and Sousa-Poza, 2004; Grogger and Hanson, 2008); and (iii) the profit tax base can easily be manipulated (by transfer pricing, debt shifting, etc.) while this is much harder for the labor (or income) tax base. Hence, *income taxation* may be relevant for headquarters location to the extent that it affects the local availability of skilled workers (and their effort) and even education choice of individuals in the long run.

There is anecdotal evidence that the (re-)location of headquarters of large multinational firms in recent years has been co-determined by issues of profit and labor taxation.[5] Most of the theoretical and empirical literature on the location of firms considers (*employee*- and *employer*-borne) income tax aspects only implicitly.[6] If

[5] E.g., this was mentioned with regard to the relocation of the European headquarters of Procter and Gamble, McDonalds, and Kraft, from London to Switzerland (see Handelsblatt, 2009).

[6] See Baldwin, Forslid, Martin, Ottaviano, and Robert-Nicoud (2003) for economic theory and Rathelot and Sillard (2008) for empirical analysis on the location of mobile firms in general; Markusen (2002) for economic theory and Strauss-Kahn and Vives (2009) for empirical analysis on the location of headquarters of multinational firms; Barba Navaretti and Venables (2006) for economic theory and Head and Mayer (2004) as well as Becker, Ekholm, Jäckle, and Muendler (2005) for empirical analysis on the location of production units of multinational firms.
Defever (2006) focuses on the co-location of non-European firms' value chain in the European

at all, previous work on firm location considered the role of profit taxation, but abstained from explicitly shedding light on income taxation issues.[7] The roles played by the *net wage*, the *income tax rate*, and, more generally, the *employee's income tax burden*, as opposed to the *employer's tax burden*, in determining firm locations are virtually unexplored.[8]

We argue that a higher *employer*-borne income tax burden on high-skilled labor *directly* reduces a firm's profits, as they represent a direct cost for the firm unless the tax burden can be fully passed on to employees. A higher *employee*-borne income tax burden exercises a negative effect on managerial effort and, hence, *indirectly* reduces a firm's profits. Provided that headquarters services intensively use high-skilled labor in particular (see Carr, Markusen, and Maskus, 2001; Markusen, 2002), the level of social security contributions and the level of income tax rates, as well as their progressivity should be important for a country's attractiveness as headquarters' location. The present paper assesses these hypotheses in the following way.

Union for the period 1997-2002 and finds that the location of service activities depends in particular on functional aspects and that headquarters location does not seem to attract any other part of a firm's value chain. Bel and Fageda (2008) employ firm-level and international flights data on major urban areas in 25 European Union member countries. Their findings indicate that, among others, the proximity to large markets and the supply of direct international flights influence the headquarters location choice positively. Davis and Henderson (2008) use panel data on auxiliary establishments of firms in the United States and show that a higher number of local service input providers and the scale of other headquarters activities nearby stimulates the agglomeration of headquarters. Strauss-Kahn and Vives (2009) investigate the location of headquarters for the United States over the years 1996 to 2001 and find that factors such as low average wages, low corporate tax rates, and the agglomeration of other headquarters in the same sector influence the relocation of headquarters positively.

[7]The paper by Egger and Radulescu (2011) is an exception. It considers the effects of labor taxation on bilateral foreign direct investment (FDI) in a cross section of 52 countries rather than headquarters location as such. Their results suggest that bilateral outward FDI is smaller the bigger the difference between host-to-parent country labor tax rates.

[8]As aid before, this may be problematic especially, with an interplay of capital-skill complementarity at the headquarters level, the relative mobility of skilled workers, and the relative difficulty of avoiding labor taxes (relative to profit taxes).

First, we construct a unique panel data set on average and marginal effective labor income taxes (including *employee*- and *employer*-borne social security contributions, tax credits, and tax allowances and deductions) for 120 economies for all years over the time span 2005-2009 which we then collapse to exploit the cross-sectional dimension.[9] We match this data set onto the universe of corresponding cross-sectional data on 37,502 firms from Compustat. This leads to a common data set of 80 countries and 35,206 firms, which can be used for the empirical analysis. The empirical results suggest that – conditional on other factors of influence such as profit taxes – the probability of a country to be chosen for headquarters location depends negatively on the average level and progressivity of a country's income tax rate, as well as on the extent of social security contributions paid by firms and employees, respectively. The results are most pronounced for employer-borne payroll taxes among all components of effective labour income taxes. On average, a one percentage point increase in a country's average labor income tax rate reduces the probability of it to attract the headquarters of the average firm by 0.023 percentage points versus 7.391 percentage points for a one percentage point increase in employer social security contributions.

The remainder of the paper is structured as follows. In the next section, we present the data, in particular, on effective labor income tax rates. Section 3 introduces the econometric approach used for empirical analysis – conditional logit and nested logit models. Section 4 summarizes the empirical results, and Section 5 concludes.

2 Data

In general, we use averaged data for explanatory variables for the period 2005-2009 and data on the dependent variable – a binary location choice indicator – for 2009.

[9]Notice that, with location choice, exploiting a short time period may be very problematic if firms display inertia in relocating headquarters in response to changes in fundamentals.

2.1 Data on headquarters location

Information on the location of firms' headquarters is available from Compustat. That data set provides the residence country of the headquarters along with other indicators regarding firm organization and balance sheet data for all firms covered – national or multinational in scope. For each company, this allows us to determine the J-nomial variable Loc and the binary variable Loc_{ij}, where the latter is unity whenever, for firm i with $i = 1, ...I$, $Loc = j$ with $j = 1, ...J$.

2.2 Data on income taxation

One contribution of this paper is the construction of a unique panel data set on effective labor income taxes for 120 countries annually for the years 2005-2009. We follow the methodology of the "Taxing Wages" approach used by the OECD, discussed by Heady (2004) and described in Egger and Radulescu (2011), to compute marginal and average effective tax rates plus the social security contributions for an individual earning the average wage or five times the average wage of an economy. Beyond social security contributions, we account for detailed provisions of the respective national tax codes such as personal tax allowances, tax credits, standard deductions, other country-specific formulae and local (subnational) taxes.[10] This data set allows us to consider the importance of the progressivity of a country's income tax schedule beyond the one of average tax rates. The latter appears of particular importance when considering the role of income taxation for high-skilled (and hence, high-income) earners, rather than average workers and employees.

This comprehensive data set on income taxation was assembled from numer-

[10]Peter, Buttrick, and Duncan (2010) compute the tax liability for pre-tax incomes equivalent to one, two, three and four times a country's GDP per capita. However, we assume gross wages to be better reflective of the actual income tax base. Also, they do not account for social security contributions and other provisions which we consider as important for inference of the effective tax burden on labor.

ous sources such as individual countries' tax laws, publications from international organizations, and data from international accounting firms. Among the most important sources, beyond individual countries' sources, we should mention the *OECD Taxing Wages* data sets for several years, *PricewaterhouseCoopers' Individual Taxes: Worldwide Summaries* for various years, *PKF International's Worldwide Tax Guide*, the *Social Security Observatory's Social Security Programs Throughout the World* for social security legislation, and the *International Labour Organization's LABORSTA* database for data on annual gross wages.

Based on the aforementioned data sources, we define the following covariates capturing aspects of the income taxation of country j: $AverageLabTax_j$ denotes the average income tax burden on an individual earning the average wage; $Prog500_j$ indicates the progression of a country's tax schedule defined as the log of one minus the difference between the marginal taxes of an individual earning five times the average wage and the marginal tax of an individual earning the average wage; $EmployeeSocSec_j$ and $EmployerSocSec_j$ represent employee- and employer-borne social security contributions, respectively.

To compute marginal income tax rates, we used information on average gross wages per employee in U.S. dollars, $Wage_j$, from the United Nations' labor statistics database, LABORSTA. For consistency's sake, we used annual sectoral wages by level of employment to create an average annual wage where possible.

2.3 Data on control variables

Several control variables for headquarters location beyond income tax variables were based on source data from the World Bank's World Development Indicators 2010 and the United Nations' Statistics Division. In particular, we used the following variables and data in all regressions: statutory corporate tax rates across potential locations ($CorpTax_j$) as a fraction of unity, measuring the intensity of profit taxation; gross domestic product in U.S. dollars as a measure of j's market size

(GDP_j); a country's capital stock in U.S. dollars $CapStock_j$ as a measure of capital abundance (given market size);[11] and on average wages per employee in U.S. dollars ($Wage_j$) as a measure of wage costs in j net of labor taxes. While data on the latter variable come from the United Nations' LABORSTA database, the ones underlying $CorpTax_j$, GDP_j, and $CapStock_j$ are from the World Bank's World Development Indicators. Moreover, in some regressions we use the share of the population with tertiary education in country j ($TertEdu_j$) based on data from Lutz, Goujon, and Sanderson (2007) to measure skill abundance, the number of flights to and from country j as a measure of infrastructure abundance to construct the following variables ($Flights_j$) from World Development Indicators, and the average firm's intensity in research and development in country j ($R\&D_j$) using information from Compustat to approximate firm-level skill demand. All variables are used in a log-transformed way. In particular, all income and profit tax measures are log-transformed after subtracting the respective fraction from unity (since some of those measures are zero). Hence, the respective variables measure a country's attractiveness in (income and profit) tax terms. All level variables enter the regressions simply in a log-transformed way.

[11] We follow Grilliches (1980) to use the perpetual inventory method for calculating country-specific capital stocks. The capital stock of country j in year t is

$$K_{jt} = K_{jt-1}(1-\delta) + I_{jt}, \tag{1}$$

where I_{jt} is real investment (gross fixed capital formation in constant U.S. dollars of the year 2000) in country j and year t and δ denotes the depreciation rate, which we assume to be 10 percent. The capital stock K_{j0} in the first period of the sample is computed as

$$K_{j0} = \frac{I_{j0}}{(\bar{g_j} + \delta)}, \tag{2}$$

where $\bar{g_j}$ represents the average annual investment growth rate over the whole time span and I_{j0} denotes investment in the first year where data are available. We then calculate the average value of K_{jt} for the years 2005-2009.

2.4 Descriptive statistics

Table 1 provides summary statistics of the data for 80 countries and 35,206 firms for which all the necessary information is available and which can subsequently be used for the empirical analysis.

[Table 1 about here]

Let us group all countries into five groups regarding per-capita income, following the classification by the World Bank.[12] Of the 35,206 headquarters covered, 27,328 are located in high-income countries, 5,252 in middle-to-high-income countries, 2,551 in middle-to-low-income economies, and 75 in low-income economies.

Table 1 suggests that the mean of the labor tax burden on an individual earning the average wage is 10.2% and the maximum is 36.3%. The average rate of progressivity is 15% and has a maximum value of 43.2%. The average values of employer-borne and employee-borne social security contributions amount to 10.8% and 7.1%, respectively, with maximum values of 37.2% and 30%, respectively. Table 1 also reports summary statistics on corporate taxes, which range from a minimum value of 0% to a maximum of 41.1% with an average value of 32.3%. The lowest

[12]Of the 80 countries in our sample, 38 fall into the high-income category, 25 into the middle-high income class, 14 are middle-low income countries, and 3 are low-income countries. The exact definition is as follows. **High-income countries:** Austria, Australia, the Bahamas, Bahrain, Belgium, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hong Kong, Hungary, Ireland, Italy, Japan, Luxembourg, Macau, Malta, the Netherlands, Norway, New Zealand, Poland, Portugal, Saudi Arabia, Singapore, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, and the United States. **Middle-to-high-income countries:** Argentina, Bulgaria, Brazil, Chile, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Gabon, Jordan, Kazakhstan, Lithuania, Latvia, Mexico, Mauritius, Malaysia, Namibia, Panama, Peru, Romania, Russia, South Africa, Thailand, and Turkey. **Middle-to-low-income countries:** Bolivia, Cote d'Ivoire, Egypt, Ghana, India, Indonesia, Morocco, Pakistan, Paraguay, the Philippines, Sri Lanka, Ukraine, Vietnam, Zambia. **Low-income countries:** Bangladesh, Kenya and Zimbabwe.

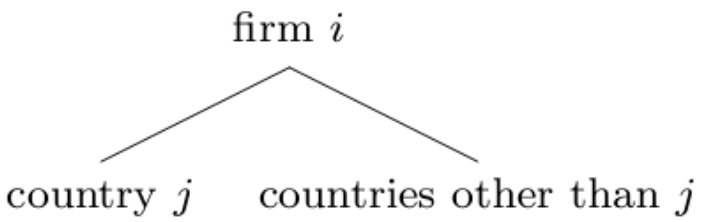

Figure 1: Conditional Logit Choice Structure

average annual wage income amounts to 19.6 U.S. dollars recorded in Zimbabwe and the highest one to 66,850 U.S. dollars recorded in Switzerland.

[Table 2 about here]

Table 2 summarizes features of the most important data across country groups by income category as defined above. As expected, higher-income countries tend to be larger, tax higher, have better infrastructure, etc., than lower-income countries. Furthermore, 77.6% of all headquarters in the sample are located in high-income economies. Middle-to-high income economies host around 14.9% of the headquarters covered, and only around 0.2% of the headquarters are located in low-income economies.

3 Empirical strategy

This section introduces the empirical specifications used to identify whether and to which extent labor taxes, social security contributions, and the progressivity of a tax system ceteris paribus play a role in a firm's decision about where to locate its headquarters.

3.1 Conditional logit

To estimate choice behavior, one model is the conditional logit model (McFadden, 1974), as illustrated in Figure 1. This model is suitable to address the question of

how a country's characteristics, such as the effective taxes on labor income, affect a country's likelihood of being chosen as a firm's headquarters location.

As previously explained in Section 2.1, we denote the dependent variable, which takes the value one if firm $i = 1, ...I$ has its headquarters in country $j = 1, ...J$ and zero otherwise by Loc_{ij}. To determine the probability that country j is chosen as the location of firm i's headquarters, we first define the deterministic net return that would be derived from locating in country j, V_{ij} as

$$V_{ij} = V(Loc_{ij} = 1|x_j, z_i) = \beta x'_j + \gamma_j z'_i, \tag{3}$$

where x_j denotes a vector of *alternative-specific* variables facing the headquarters of firm i in country j, such as $AverageLabTax_j$, $Prog500_j$, $EmployeeSocSec_j$, $EmployerSocSec_j$, $CorpTax_j$, GDP_j, $CapStock_j$, $Wage_j$, $TertEdu_j$, $Flights_j$, and $R\&D_j$, and z_i is a vector of *firm-specific* variables.

The conditional probability of headquarters location for firm i in country j is first estimated using the following logistic regression model

$$Pr(Loc_{ij} = 1|x_j, z_i) = \frac{e^{V_{ij}}}{\sum_{l=1}^{J} e^{V_{il}}} = \frac{e^{\beta x'_j + \gamma_j z'_i}}{\sum_{l=1}^{J} e^{\beta x'_l + \gamma_l z'_i}}, \quad j = 1...J \tag{4}$$

Because we are ultimately interested in estimating the probability of any headquarters locating in country j, rather than in estimating the one of a specific headquarters i locating in j, we exclude *firm-specific* variables and rewrite the net return maximization model and the conditional probability in general terms as

$$V_{ij} = V(Loc_{ij} = 1|x_j) = \beta x'_j \tag{5}$$

$$Pr(Loc_{ij} = 1|x_j) = \frac{e^{V_{ij}}}{\sum_{l=1}^{J} e^{V_{il}}} = \frac{e^{\beta x'_j}}{\sum_{l=1}^{J} e^{\beta x'_l}}, \forall l = 1, ...J : j \neq l \tag{6}$$

As is well known, β can be estimated consistently if the following assumptions hold: first, error terms associated with the stochastic version of (6) must be identically and independently distributed and, second, the independence of irrelevant alternatives (IIA) criterion must be met. It turns out that international headquarters' location

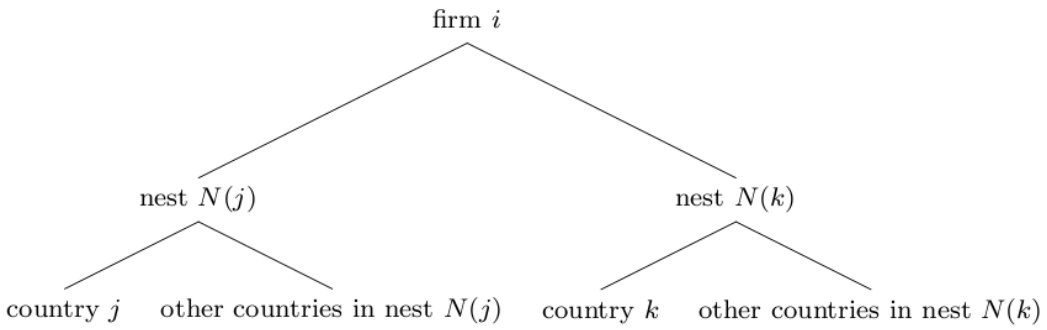

Figure 2: Nested Logit Choice Structure

choice does not meet the *IIA* criterion. Hence, including some previously omitted country could alter the probability at which similar countries are chosen. For example, exclusion of Canada from the list of alternative countries could increase the probability that firms locate in the United States. Similarly, Germany and France could have correlated error terms, both being in Europe. This correlation is ruled out under *IIA*; therefore, the conditional logit model runs the risk to produce biased estimates of the effects of taxes on the location decision. We summarize the conditional logit model and its respective choice probabilities and marginal effects in Tables 3-5.

3.2 Nested logit

To overcome the bias of the conditional logit model flowing from a violation of the *IIA*, we employ the nested logit model as an alternative econometric approach, because it relaxes the *IIA* criterion by employing a hierarchical choice structure. In the nested logit model, we group countries by per-capita income, (low, middle-low, middle, middle-high, and high) in 2005 following the World Bank's categorization as introduced in Section 2.4. The decision to locate in country j is split into first the choice of the nest of countries j belongs in, $N(j)$, which is determined by *nest-specific* characteristics that do not vary within the nest, and subsequently, the choice among the countries within the nest, as illustrated in Figure 2.

The deterministic net return of firm i from locating its headquarters in country j is then specified as

$$V_{ij} = V(Loc_{ij} = 1|x_j, w_n, z_i) = \beta x'_j + \delta_n w'_n + \gamma_j z'_i, \tag{7}$$

where x_j is a vector of *alternative-specific* variables firm i faces in country j, w_n denotes a vector of *nest-specific* variables determining the choice of nest $N(j)$, and z_i is a vector of *firm-specific* variables.[13] In the absence of z_i, the generalized net return maximization model now reads

$$V_{ij} = V(Loc_{ij} = 1|x_j, w_n) = \beta x'_j + \delta_n w'_n. \tag{8}$$

The probability of locating in country j can be split into the product of the conditional probability of locating in country j if country j belongs in nest $N(j)$ – term (a) in equation (9) – and the probability of j being in nest $N(j)$ – term (b) in equation (9).

$$Pr(Loc_{ij} = 1|x_j) = \underbrace{Pr(Loc_{ij} = 1|x_j \in N(j))}_{(a)} \times \underbrace{Pr(j \in N(j))}_{(b)} \tag{9}$$

We split the two components of equation (9) above, namely the conditional probability within nest $N(j)$, term (a), and the probability of country j being in nest $N(j)$, term (b), to derive the model for the probability of locating in country j. Starting with term (a), we can describe the conditional probability within nest $N(j)$ as

$$Pr(Loc_{ij} = 1|x_j \in N(j)) = \frac{e^{\frac{V_{ij}}{\tau_{N(j)}}}}{\sum_{l \in N(j)} e^{IV_{N(j)}}}, \forall j \neq l \in N(j) \tag{10}$$

where

$$IV_{N(j)} = \ln \sum_{l \in N(j)} e^{\frac{V_{ij}}{\tau_{N(j)}}}. \tag{11}$$

[13] In the generalized version, we set up the nested logit model such that the *alternative-specific* variables have a *non-alternative-specific* coefficient, while the *nest-specific* variables have *nest-specific* coefficients. We do this since *alternative-specific* variables will have an equal influence on firms, while the influence of *nest-specific* variables are indeed *nest-specific*.

The random net return maximization model adopted here imposes the least restrictions on the structure of the nested logit model and allows us to compare countries even across nests rather than only within a nest. In that model, the dissimilarity parameter, $\tau_{N(j)}$, is a measure of the uniqueness of the country-alternatives within nest $N(j)$ and is defined as

$$\tau_{N(j)} = \sqrt{1 - \rho_{N(j)}} \tag{12}$$

where $\rho_{N(j)}$ denotes the correlation coefficient within nest $N(j)$, which is determined by the error correlation among the individual alternatives in nest $N(j)$. If the correlation among countries within a nest is positive, then $\tau_{N(j)}$ will be within the unit interval.[14]

The term (b) in equation (9) represents the conditional probability of choosing country j in nest $N(j)$ and can be expressed as

$$Pr(j \in N(j)) = \frac{e^{\tau_{N(j)} IV_{N(j)}}}{\sum_{k \in N(k)} e^{\tau_{N(k)} IV_{N(k)}}}, \forall N(j) \neq N(k) \tag{13}$$

By multiplying the two probabilities defined in equations (10) and (13), we obtain the probability of choosing country j as the headquarters location.

$$Pr(Loc_{ij} = 1 | x_j) = \frac{e^{\frac{V_{ij}}{\tau_{N(j)}}}}{\sum_{l \in N(j)} e^{\frac{V_{il}}{\tau_{N(j)}}}} \times \frac{e^{\tau_{N(j)} IV_{N(j)}}}{\sum_{k \in N(k)} e^{\tau_{N(k)} IV_{N(k)}}}, \forall j \neq l \in N(j), N(j) \neq N(k) \tag{14}$$

By obtaining estimates for the V_{ij} in the nested logit model, we can evaluate the probability of choosing country j as a location of headquarters. We will summarize the nested logit model results and the respective choice probabilities and marginal effects in Tables 6-8.

[14] It is possible that the correlation of countries within a nest is negative, resulting in a $|\tau_{N(j)}| > 1$.

4 Estimation results

As explained above, we hypothesize ceteris paribus a negative effect of $AverageLabTax_j$, $Prog500_j$, $EmployeeSocSec_j$ and $EmployerSocSec_j$, on a country's attractiveness as a potential headquarters location. Higher labor income taxes, higher *employee*-borne social security contributions and a more progressive tax system exert a negative effect on effort of high-income earners, such as managers and engineers, whereas higher *employer*-borne social security contributions represent higher direct labor costs for firms such that all four variables negatively affect expected profits, directly or indirectly. The effects of these variables of interest are estimated conditionally on a number of aforementioned control variables such as $CorpTax_j$, GDP_j, $CapStock_j$, $Wage_j$, $TertEdu_j$ and $Flights_j$, and three interaction terms, $Wage_j \times TertEdu_j$, $CapStock_j \times GDP_j$ and $Wage_j \times GDP_j$. These control variables account for determinants of headquarters location choice beyond labor taxes.

We rationalize the effects of these additional controls in the following way: higher corporate taxes $CorpTax_j$ and higher average gross wages $Wage_j$ should reduce a country's attractiveness as a potential location for headquarters since they both reduce profits ceteris paribus. In line with previous theoretical research, we expect that a higher capital stock $CapStock_j$, a proxy for the availability of capital in a country, and a higher GDP_j as a measure of market size positively influence the inclination of firms to locate in a particular country. Finally, a more educated population, $TertEdu_j$, as well as a better traffic and airport infrastructure, $Flights_j$ should also increase a country's attractiveness as a potential host for headquarters. The interaction terms $Wage_j \times TertEdu_j$, $Wage_j \times GDP_j$ and $CapStock_j \times GDP_j$ control for a possibly lesser importance of wage costs in skill-abundant and large markets on the one hand and of market size and capital-abundance (as a measure of development) on the other hand. All variables except $AverageLabTax_j$, $Prog500_j$, $CorpTax_j$, $EmployeeSocSec_j$ and $EmployerSocSec_j$ are measured in logs. For these variables we use the log of one minus the respective variable in our regressions, since a considerable number of countries have labor income, social security, and

corporate income taxes of zero. This is why positive coefficients for the first five dependent variables reported in Tables 3 and 6 actually reflect the negative impact of the underlying tax components.

4.1 Conditional logit results

Table 3 presents the regression results for the conditional logit specification. In this table, we report the results of three alternative specifications, which differ with respect to the number of control variables included. All coefficients of the main variables of interest, namely $AverageLabTax_j$, $Prog500_j$, $EmployeeSocSec_j$, and $EmployerSocSec_j$, are negative and highly significant in all three model specifications. Headquarters location choice obviously depends on other factors beyond labor taxes. Capital abundance and market size display a positive effect on the decision to locate in a particular country, as expected. The opposite effect holds for a higher corporate tax or higher average wages that negatively influence a country's attractiveness as a possible host for firms' headquarters. In Models (2) and (3), we also account for the influence of the population with tertiary education. The coefficient of interest is positive and highly significant. Moreover, a better airport infrastructure, as captured by the number of international flights, increases the probability of locations choice. Many of the estimated parameters are significant at one percent.

[Tables 3-5 about here]

However, we should be careful with the interpretation of the coefficients of our main variables of interest presented in Table 3, as the underlying econometric model is non-linear in the parameters. In order to obtain more informative results, we translate these coefficients into marginal probabilities and marginal effects, which are presented in Tables 4 and 5, respectively. Table 4 displays the marginal probabilities of locating in each of the countries in our sample. These range from high values such as 18 percentage points in the U.S. or 14 percentage points in Japan to values

as low as 0.006 percentage points in Barbados. Table 5 reports the marginal effects obtained from the conditional logit specification for all countries in our sample using all the variables contained in Model (2). Column A in Table 5 shows the results for a one percentage point increase in the labor income tax whereas Columns B and C report the results for a marginal increase in the degree of progressivity of a country's tax system and the corporate income tax rate, respectively. The last two columns, namely Columns D and E, display the results for a one percentage point increase in the employer- and employee-borne social security contributions. Accordingly, on average a one percentage point increase in a country's average labor income tax leads to a decrease in the conditional probability of a country as a potential location for headquarters by 0.023 percentage points. A glance at the numbers suggests that for a one percentage point increase in a country's average labor income tax, the reduction in probabilities range between 0.228 percentage points in Japan or 0.302 percentage points in the U.S. to no change at all in countries such as Bolivia or Zambia. As the numbers in Column D of Table 5 suggest, the results are most pronounced for a marginal change in employer-borne social security contributions. Accordingly, the decrease in the conditional probability of a country as a potential location for headquarters is on average 7.391 percentage points. These results confirm our prior, since, as argued in the introduction, employer-borne payroll taxes represent direct costs for the company, whereas higher labour income taxes influence profits only indirectly, via lower marginal effort. One should also note that the numbers in Column C of Table 5 imply a lower magnitude of the marginal effects for an increase in the corporate tax. We argue that this result can be ascribed to the possibility of corporate profit shifting to low tax locations. In comparison, the income tax base (wage bill) cannot be as easily manipulated as the profit tax base, which leads to relatively bigger effects of labour income taxes and social security contributions on the location choice than of profit taxes.[15]

[15]These results are in line with Strauss-Kahn and Vives (2009) who also find low elasticities for the corporate tax. In their study, corporate tax levels are insignificant in a region-nested model but have a significant impact on the headquarters location choice in a population-nested model.

4.2 Nested logit results

For the reasons explained in Section 3.1, the nested logit model is a more appropriate technique to correctly identify the headquarters location choice. Table 6 reports the results of a nested logit model, employing the average log of GDP per capita for each nest as the *nest-specific* variable, w_n. As in the conditional logit specification, the coefficients of our main variables of interest, namely $AverageLabTax_j$, $Prog500_j$, $EmployeeSocSec_j$, and $EmployerSocSec_j$ are positive[16] and highly significant in all three models. The results reported as under Models (1), (2) and (3) just differ with respect to the number of covariates employed, as explained in Section 4.1 above. The size of the coefficients for $Prog500_j$, $EmployerSocSec_j$, and $CorpTax_j$ are about the same as in Table 3 and they are higher for $AverageLabTax_j$ and $EmployeeSocSec_j$. The marginal effects for all countries in our sample are reported in Table 8.

Table 8 displays the results for a one percentage point increase in the – average labor income tax (Column A), in the tax system's degree of progressivity (Column B), in the corporate income tax (Column C) and in employer- and employee-borne social security contributions (Columns D and E) – on the probability of headquarters location in a specific country. A one percentage point rise in the average labor income tax induces on average a decrease in the probability of a high-income country of being a potential location for headquarters by 0.072 percentage points. The reduction in probability is smaller for the other country groups amounting to 0.032, 0.032, and 0.002 percentage points for middle-high, middle-low and low income economies, respectively. Once again, the results vary to a large extent among countries. In the United States, a one percentage point rise in the average labor income tax induces a reduction in the probability of headquarters locating there by 0.619 percentage

Hence, in the latter specification, a one percentage point rise in the corporate tax rate reduces the probability of a state as a headquarters location by 2.25%. As Strauss-Kahn and Vives (2009) also note, these lower elasticities compared to other studies can also be explained by the fact that these studies focus on manufacturing firms which creates an upward bias in the corporate tax effect whereas Strauss-Kahn and Vives (2009) and we use data on headquarters in all economic sectors.

[16] See explanation in Section 4.

points, whereas in countries such as Bahamas the reduction amounts to only 0.004 percentage points.

[Tables 6-8 about here]

Once again, the strongest effects arise in case of employer-borne social security contributions (Column D), where the decrease in probability is 1.5 times as large as for the average labour income tax (Column A). Akin to the conditional logit model results profit taxes are found to be less important than income tax elements for headquarters location choice. Overall, our findings suggest that the level of the labor income tax, the progressivity of a country's income tax schedule, and *employee*- and *employer*-borne social security contributions affect the conditional probability of a country being chosen as the headquarters location to a sizable extent, e.g., when being compared to profit taxation. Furthermore, for the reasons explained in Section 3.2, the nested model relaxes the IIA criterion and accordingly especially the marginal effects of social security contributions are tempered compared to the conditional logit model.

5 Conclusion

This paper provides evidence on the impact of different components of effective labor taxes on the international location decision of firms' headquarters using data on 35,026 firms' headquarters and 80 countries. We compile a unique data set on effective labor income taxes comprising besides labor taxes also both employee-borne and employer-borne social security contributions as well as further country specific regulations. We merge this tax data with data from Compustat that provides information on the location of firms' headquarters and data from WDI on country specific characteristics. The richness of our tax data and the large number of firm headquarters' observations as well as the econometric specifications employed allow a more

precise identification of the impact of effective labor taxes on firms headquarters' location.

Overall, our findings suggest that the progressivity of a country's tax schedule, the social security contributions levied and the level of the labor income tax affect the conditional probability of firms' headquarters location choice. The results are most pronounced for employer-borne payroll taxes. Hence, a one percentage point increase in a country's average labor income tax leads - on average- to a reduction in the probability of a country as a potential location for headquarters by 0.023 percentage points whereas a one percentage point increase in a country's employer social security contributions reduces the probability of headquarters' location by even 7.391 percentage points.

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Appendix

Table 1: Summary Statistics for Overall Sample

	Mean	Stddev	Median	Max	Min	Nb-obs
	(1)	(2)	(3)	(4)	(5)	(6)
$AverageLabTax$	0.102	0.071	0.108	0.363	0.000	35,206
$Prog500$	0.150	0.155	0.143	0.432	0.000	35,206
$EmployerSocSec$	0.110	0.065	0.95	0.372	0.000	35,206
$EmployeeSocSec$	0.075	0.048	0.071	0.300	0.000	35,206
$CorpTax$	0.323	0.066	0.331	0.411	0.000	35,206
$GDP, mil.$	3,908,000	4,767,000	2,470,000	13,720,000	3,418	35,206
$CapStock, mil.$	5,323,000	5,960,000	2,640,000	16,410,000	8,060	35,206
$TertEdu$	0.583	0.129	0.587	0.858	0.167	35,206
$Wage$	34,143.721	18,369.533	39,687.343	66,850.955	19.583	35,206

Notes: GDP and $CapStock$ are expressed in millions USD.

Table 2: Summary Statistics for All Countries Classified by Income Categories

	Mean	Stddev	Median	Max	Min	Nb-obs
	(1)	(2)	(3)	(4)	(5)	(6)
High Income Economies						
$AverageLabTax$	0.123	0.065	0.150	0.293	0.000	27,328
$Prog500$	0.163	0.075	0.164	0.432	0.005	27,328
$EmployerSocSec$	0.111	0.057	0.095	0.276	0.006	27,328
$EmployeeSocSec$	0.085	0.045	0.081	0.300	0.014	27,328
$CorpTax$	0.329	0.072	0.394	0.411	0.125	27,328
$GDP, mil.$	4,648,000	5,020,000	2,470,000	13,720,000	6,587	27,328
$CapStock, mil.$	6,305,000	6,200,000	2,640,000	16,410,000	8,060	27,328
$TertEdu$	0.626	0.102	0.639	0.858	0.259	27,328
$Wage$	42,688.271	10,330.532	44,722.885	66,850.955	7,007.540	27,328
Middle-High Income Economies						
$AverageLabTax$	0.035	0.036	0.013	0.238	0.000	5,252
$Prog500$	0.123	0.041	0.125	0.198	0.000	5,252
$EmployerSocSec$	0.148	0.078	0.112	0.372	0.019	5,252
$EmployeeSocSec$	0.053	0.044	0.048	0.187	0.000	5,252
$CorpTax$	0.289	0.038	0.300	0.350	0.122	5,252
$GDP, mil.$	1,477,000	1,542,000	271,200	3,600,000	7,644	5,252
$CapStock, mil.$	2,100,000	2,343,000	388,400	5,378,000	9,017	5,252
$TertEdu$	0.513	0.128	0.587	0.797	0.167	5,252
$Wage$	7,685.093	4,964.534	4,699.977	18,640.977	1,110.978	5,252
Middle-Low Income Economies						
$AverageLabTax$	0.028	0.051	0.017	0.238	0.000	2,551
$Prog500$	0.149	0.052	0.187	0.187	0.000	2,551
$EmployerSocSec$	0.026	0.039	0.000	0.268	0.000	2,551
$EmployeeSocSec$	0.012	0.020	0.000	0.087	0.000	2,551
$CorpTax$	0.337	0.025	0.345	0.363	0.200	2,551
$GDP, mil.$	777,800	436,200	1,107,000	1,107,000	11,370	2,551
$CapStock, mil.$	1,042,000	618,800	1,512,000	1,512,000	9,733	2,551
$TertEdu$	0.349	0.067	0.313	0.814	0.199	2,551
$Wage$	1,396.130	1,305.294	907.845	8,546.952	19.583	2,551
Low Income Economies						
$AverageLabTax$	0.127	0.153	0.045	0.363	0.012	75
$Prog500$	0.094	0.049	0.100	0.148	0.026	75
$EmployerSocSec$	0.011	0.009	0.013	0.022	0.000	75
$EmployeeSocSec$	0.011	0.009	0.013	0.022	0.000	75
$CorpTax$	0.303	0.004	0.300	0.309	0.300	75
$GDP, mil.$	36,440	28,960	25,780	71,910	3,418	75
$CapStock, mil.$	47,440	38,940	23,520	97,160	11,330	75
$TertEdu$	0.353	0.108	0.303	0.517	0.264	75
$Wage$	1,250.198	634.511	1,102.263	2,107.325	601.140	75

Notes: *GDP* and *CapStock* are expressed in millions USD. High-income countries: AUS, AUT, BEL, BHR, BHS, CAN, CHE, CYP, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HKG, HRV, HUN, IRL, ITA, JPN, KOR, LUX, MAC, MLT, NLD, NOR, NZL, POL, PRT, SAU, SGP, SVK, SVN, SWE, USA; Middle-high-income countries: ARG, BGR, BRA, CHL, CHN, COL, CRI, DOM, ECU, GAB, JOR, KAZ, LTU, LVA, MEX, MUS, MYS, NAM, PAN, PER, ROM, RUS, THA, TUR, ZAF; Middle-low-income countries: BOL, CIV, EGY, GHA, IDN, IND, LKA, MAR, PAK, PHL, PRY, UKR, VNM, ZMB; Low-income countries: BGD, KEN, ZWE.

Table 3: Conditional Logit Results for Country Choice

	Model	Model	Model
	(1)	(2)	(3)
$ln(1 - AverageLabTax)$	1.730***	1.356***	0.387**
	0.109	0.149	0.169
$ln(1 - Prog500)$	0.598***	0.590***	0.507***
	0.089	0.096	0.108
$ln(1 - EmployerSocSec)$	5.202***	5.709***	4.897***
	0.077	0.095	0.107
$ln(1 - EmployeeSocSec)$	1.943***	2.055***	0.539***
	0.143	0.146	0.168
$ln(1 - CorpTax)$	1.413***	0.585***	1.574**
	0.076	0.124	0.133
$ln(GDP)$	1.211***	1.408***	0.706***
	0.066	0.081	0.098
$ln(CapStock)$	2.948***	2.908***	3.384***
	0.080	0.091	0.1385
$ln(Wage)$	−0.004	−0.208	−0.223
	0.127	0.142	0.167
$ln(TertEdu)$		1.924***	2.332***
		0.213	0.234
$ln(Flights)$			0.311***
			0.015
$ln(R\&D)$			−0.095***
			0.004
$ln(Wage \times TertEdu)$		−0.207***	−0.269***
		0.022	0.024
$ln(CapStock \times GDP)$	−0.062***	−0.066***	−0.065***
	0.005	0.003	0.004
$ln(Wage \times GDP)$	0.009*	0.011**	0.008
	0.003	0.005	0.006
$Cases$	35,840	35,206	34,136
LR	90,832.95***	79,900.74***	59,591.48***
$Pseudo - R^2$	0.2763	0.2595	0.2183

Notes: Choice of country using conditional logit model. Standard errors are reported underneath the coefficients. The symbols ***, ** and * are used to denote the significance at 1, 5 and 10 percent levels, respectively.

Table 4: Conditional Logit Marginal Probabilities

Country	Model (1)	Model (2)	Model (3)	*Country*	Model (1)	Model (2)	Model (3)
ARE	0.494	-	-	*KOR*	5.706	5.699	6.619
ARG	0.335	0.379	0.432	*KWT*	0.201	-	-
ATG	0.004	-	-	*LBN*	0.104	-	-
AUS	3.361	3.412	3.721	*LKA*	0.065	0.091	0.162
AUT	0.686	0.579	0.771	*LTU*	0.034	0.036	0.045
BEL	0.548	0.578	0.629	*LUX*	0.112	0.133	0.14
BGD	0.258	0.251	0.161	*LVA*	0.036	0.038	0.077
BGR	0.064	0.069	-	*MAC*	0.074	0.084	-
BHR	0.062	0.062	-	*MAR*	0.273	0.341	0.353
BHS	0.079	0.066	-	*MDA*	0.008	-	-
BMU	0.021	-	-	*MEX*	2.588	2.727	2.22
BOL	0.013	0.016	-	*MLT*	0.009	0.012	-
BRA	1.275	1.491	1.117	*MUS*	0.023	0.027	-
BRB	0.006	-	-	*MYS*	0.669	0.747	1.094
BWA	0.056	-	-	*NAM*	0.014	0.023	-
CAN	3.728	4.24	4.679	*NLD*	1.337	1.308	1.303
CHE	2.496	2.164	1.564	*NOR*	1.108	1.104	-
CHL	0.557	0.604	1.013	*NZL*	0.699	0.811	1.215
CHN	3.595	3.533	3.737	*OMN*	0.156	-	-
CIV	0.005	0.002	-	*PAK*	0.256	0.288	0.309
COL	0.129	0.152	-	*PAN*	0.03	0.037	-
CRI	0.052	0.064	-	*PER*	0.202	0.264	0.383
CYP	0.068	0.068	-	*PHL*	0.257	0.342	0.534
CZE	0.205	0.206	0.184	*PNG*	0.006	-	-
DEU	3.686	3.449	3.419	*POL*	0.574	0.585	0.638
DNK	1.549	1.544	0.618	*PRT*	0.497	0.565	0.76
DOM	0.06	0.07	-	*PRY*	0.03	0.032	-
ECU	0.127	0.148	-	*QAT*	0.301	-	-
EGY	0.178	0.183	-	*ROM*	0.05	0.048	0.072
ESP	1.929	1.905	1.962	*RUS*	1.278	1.373	1.013
EST	0.024	0.025	0.027	*SAU*	1.454	1.634	1.198
FIN	0.441	0.422	0.4	*SEN*	0.009	-	-
FRA	1.884	1.835	1.839	*SGP*	0.759	0.776	0.948
GAB	0.014	0.02	-	*SVK*	0.106	0.107	0.154
GBR	5.785	6.298	6.159	*SVN*	0.069	0.067	0.071
GHA	0.021	0.026	-	*SWE*	0.637	0.62	-
GRC	0.452	0.548	0.884	*SWZ*	0.003	-	-
HKG	2.244	2.226	2.38	*THA*	1.318	1.37	1.294
HRV	0.095	0.101	0.09	*TTO*	0.057	-	-
HUN	0.145	0.134	0.103	*TUN*	0.063	-	-
IDN	1.006	1.12	1.478	*TUR*	0.698	0.741	1.006
IND	3.628	3.521	3.844	*UKR*	0.126	0.151	-
IRL	1.239	1.187	1.639	*USA*	17.929	17.837	19.136
ISL	0.074	-	-	*VEN*	0.553	-	-
ISR	0.705	-	-	*VNM*	0.078	0.051	-
ITA	1.853	1.791	1.486	*ZAF*	1.113	1.422	1.14
JOR	0.036	0.049	0.06	*ZAR*	0.005	-	-
JPN	13.756	14.638	14.494	*ZMB*	0.008	0.01	-
KAZ	0.078	0.102	-	*ZWE*	0.01	0.013	0.03
KEN	0.049	0.055	0.041				
Mean	1.019	1.261	1.834				

Notes: The list includes all countries that are used in the conditional logit models (see Table 3 for model specifications). (0-100%)

Table 5: Conditional Logit Marginal Effects

Country	(A)	(B)	(C)	(D)	(E)	Country	(A)	(B)	(C)	(D)	(E)
ARG	−0.007	−0.003	−0.003	−2.646	−0.886	*JPN*	-0.228	−0.098	−0.125	−78.894	−28.668
AUS	−0.071	−0.022	−0.028	−20.028	−6.834	*KAZ*	-0.002	−0.001	−0.001	−0.731	−0.227
AUT	−0.012	−0.004	−0.005	−4.122	−1.369	*KEN*	-0.001	0.000	0.000	−0.313	−0.115
BEL	−0.012	−0.004	−0.005	−4.197	−1.315	*KOR*	-0.095	−0.041	−0.043	−32.799	−11.782
BGD	−0.005	−0.002	−0.002	−1.398	−0.513	*LKA*	-0.002	−0.001	−0.001	−0.542	−0.200
BGR	−0.001	0.000	0.000	−0.471	−0.158	*LTU*	-0.001	0.000	0.000	−0.260	−0.076
BHR	−0.001	0.000	0.000	−0.374	−0.134	*LUX*	-0.003	−0.001	−0.001	−0.836	−0.308
BHS	−0.001	0.000	0.000	−0.386	−0.139	*LVA*	-0.001	0.000	0.000	−0.263	−0.084
BOL	0.000	0.000	0.000	−0.101	−0.036	*MAC*	-0.001	−0.001	−0.001	−0.470	−0.172
BRA	−0.026	−0.011	−0.013	−9.952	−3.198	*MAR*	-0.007	−0.002	−0.003	−2.051	−0.722
CAN	−0.082	−0.026	−0.036	−24.794	−8.775	*MEX*	-0.049	−0.019	−0.022	−16.536	−5.474
CHE	−0.040	−0.015	−0.016	−13.096	−4.806	*MLT*	0.000	0.000	0.000	−0.071	−0.026
CHL	−0.010	−0.004	−0.004	−3.494	−1.508	*MUS*	0.000	0.000	0.000	−0.158	−0.055
CHN	−0.060	−0.022	−0.029	−24.596	−7.117	*MYS*	-0.013	−0.005	−0.006	−4.644	−1.674
CIV	0.000	0.000	0.000	−0.015	−0.005	*NAM*	-0.001	0.000	0.000	−0.131	−0.047
COL	−0.003	−0.001	−0.001	−1.139	−0.328	*NLD*	-0.022	−0.013	−0.010	−8.188	−3.764
CRI	−0.001	0.000	−0.001	−0.410	−0.141	*NOR*	-0.023	−0.007	−0.009	−6.860	−2.398
CYP	−0.001	0.000	0.000	−0.414	−0.146	*NZL*	-0.019	−0.005	−0.007	−4.490	−1.645
CZE	−0.004	−0.001	−0.002	−1.533	−0.462	*PAK*	-0.005	−0.002	−0.003	−1.720	−0.593
DEU	−0.066	−0.028	−0.030	−22.259	−8.269	*PAN*	-0.001	0.000	0.000	−0.239	−0.082
DNK	−0.037	−0.009	−0.012	−8.529	−3.471	*PER*	-0.005	−0.002	−0.002	−1.610	−0.605
DOM	−0.001	−0.001	−0.001	−0.444	−0.152	*PHL*	-0.007	−0.002	−0.003	−2.036	−0.726
ECU	−0.003	−0.001	−0.001	−0.912	−0.329	*POL*	-0.011	−0.004	−0.004	−3.866	−1.392
EGY	−0.003	−0.001	−0.001	−1.250	−0.408	*PRT*	-0.011	−0.004	−0.004	−3.856	−1.260
ESP	−0.036	−0.015	−0.016	−13.507	−4.016	*PRY*	-0.001	0.000	0.000	−0.201	−0.070
EST	−0.001	0.000	0.000	−0.181	−0.052	*ROM*	-0.001	0.000	0.000	−0.418	−0.109
FIN	−0.009	−0.003	−0.003	−2.887	−0.944	*RUS*	-0.026	−0.008	−0.010	−9.578	−2.769
FRA	−0.035	−0.012	−0.016	−13.773	−4.236	*SAU*	-0.028	−0.010	−0.012	−9.933	−3.575
GAB	0.000	0.000	0.000	−0.125	−0.042	*SGP*	-0.014	−0.005	−0.006	−4.831	−1.883
GBR	−0.119	−0.042	−0.049	−36.390	−13.139	*SVK*	-0.002	−0.001	−0.001	−0.781	−0.243
GHA	−0.001	0.000	0.000	−0.164	−0.056	*SVN*	-0.001	0.000	−0.001	−0.468	−0.167
GRC	−0.010	−0.004	−0.004	−3.869	−1.273	*SWE*	-0.013	−0.005	−0.005	−4.352	−1.332
HKG	−0.038	−0.015	−0.015	−12.745	−4.569	*THA*	-0.024	−0.009	−0.011	−7.910	−2.901
HRV	−0.002	−0.001	−0.001	−0.656	−0.248	*TUR*	-0.015	−0.005	−0.006	−4.961	−1.714
HUN	−0.003	−0.001	−0.001	−0.996	−0.308	*UKR*	-0.003	−0.001	−0.001	−1.139	−0.316
IDN	−0.021	−0.007	−0.009	−6.489	−2.307	*USA*	-0.302	−0.096	−0.142	−88.964	−32.353
IND	−0.059	−0.025	−0.030	−18.980	−6.949	*VNM*	-0.001	0.000	0.000	−0.332	−0.110
IRL	−0.024	−0.007	−0.008	−7.229	−2.477	*ZAF*	-0.027	−0.010	−0.012	−7.977	−2.895
ITA	−0.036	−0.014	−0.016	−12.907	−3.868	*ZMB*	0.000	0.000	0.000	−0.060	−0.022
JOR	−0.001	0.000	0.000	−0.302	−0.105	*ZWE*	0.000	0.000	0.000	−0.073	−0.027
Mean	−0.023	−0.008	−0.010	−7.391	−2.596						

Notes: The list includes all countries that are used in the conditional logit model (see Table 3 for model specification). Column A: Marginal effect of a one percentage point increase in the average labor income tax rate. Column B: Marginal effect of a one percentage point increase in the tax system's degree of progressivity. Column C: Marginal effect of a one percentage point increase in the corporate tax rate. Column D: Marginal effect of a one percentage point increase in the employer-based social security contributions. Column E: Marginal effect of a one percentage point increase in the employee-based social security contributions.

Table 6: Nested Logit Results for Country Choice

	Model	Model	Model
Alternative-Specific	(1)	(2)	(3)
$ln(1 - AverageLabTax)$	4.064***	5.070***	4.352***
	0.810	1.029	0.818
$ln(1 - Prog500)$	1.657***	1.917***	1.397***
	0.346	1.424	0.298
$ln(1 - EmployerSocSec)$	5.986***	7.178***	5.413***
	1.167	1.424	0.993
$ln(1 - EmployeeSocSec)$	2.738***	2.756***	3.720***
	0.565	0.578	0.708
$ln(1 - CorpTax)$	2.106***	0.452*	2.139***
	0.424	0.198	0.432
$ln(GDP)$	0.018	0.071***	−1.621***
	0.133	0.145	0.331
$ln(CapStock)$	4.290***	4.541***	5.077***
	0.841	0.906	0.936
$ln(Wage)$	−2.782***	−4.465***	−6.206***
	0.605	0.928	1.158
$ln(TertEdu)$		3.577***	3.256***
		0.754	0.652
$ln(Flights)$			0.425***
			0.080
$ln(R\&D)$			−0.182***
			0.033
$ln(Wage \times TertEdu)$		−0.327***	−0.329***
		0.070	0.067
$ln(CapStock \times GDP)$	−0.082***	−0.098***	−0.092***
	0.016	0.020	0.018
$ln(Wage \times GDP)$	0.135***	0.187***	0.256***
	0.028	0.039	0.067
Nest-Specific			
$High - Income$			
$ln(GDP_{percapita})$	−0.079	0.409	0.238
	0.162	1.432	1.539
τ	1.435	1.513	1.730
	0.279	0.300	0.314
$Middle - High - Income$			
$ln(GDP_{percapita})$	0.397***	0.843	0.808
	0.064	1.714	1.835
τ	1.025	0.945	0.771
	0.199	0.188	0.141
$Middle - Low - Income$			
$ln(GDP_{percapita})$	0.645***	1.194	1.105
	0.157	2.057	2.199
τ	0.935	0.746	0.602
	0.183	0.149	0.112
$Low - Income$			
$ln(GDP_{percapita})$	0.216	−0.758	−0.564
	(*base*)	(*base*)	(*base*)
τ	3.517	12.663	10.982
	1.139	13.775	14.643
Cases	35,840	35,206	34,136
Log-Likelihood	−118,597.78	−113,644.92	−106,131.19
LR for IIA	273.98***	402.57***	692.58***

Notes: Choice of country using nested logit model with income nesting. Model (1) (2) and (3) use the respective conditional logit models, modified for nested logit using the nest-average $GDP_{percapita}$. Standard errors are reported underneath the coefficients. The symbols ***, ** and * are used to denote the significance at 1, 5 and 10 percent levels, respectively.

Table 7: Nested Logit Marginal Probabilities

Country	Model (1)	Model (2)	Model (3)	*Country*	Model (1)	Model (2)	Model (3)
ARE	0.368	-	-	*KOR*	4.999	5.306	6.191
ARG	0.266	0.298	0.215	*KWT*	0.187	-	-
ATG	0.002	-	-	*LBN*	0.097	-	-
AUS	3.078	3.098	3.620	*LKA*	0.071	0.126	0.310
AUT	0.811	0.754	0.965	*LTU*	0.019	0.014	0.008
BEL	0.640	0.655	0.717	*LUX*	0.127	0.145	0.149
BGD	0.093	0.080	0.081	*LVA*	0.023	0.020	0.023
BGR	0.043	0.051	-	*MAC*	0.080	0.097	-
BHR	0.070	0.094	-	*MAR*	0.671	0.634	0.363
BHS	0.113	0.107	-	*MDA*	0.009	-	-
BMU	0.032	-	-	*MEX*	2.554	2.454	2.074
BOL	0.012	0.006	-	*MLT*	0.010	0.018	-
BRA	1.374	1.607	1.197	*MUS*	0.015	0.014	-
BRB	0.007	-	-	*MYS*	1.035	1.334	2.739
BWA	0.040	-	-	*NAM*	0.005	0.003	-
CAN	3.372	3.799	4.010	*NLD*	1.298	1.378	1.063
CHE	2.975	2.644	1.852	*NOR*	1.147	1.167	-
CHL	0.587	0.682	1.019	*NZL*	0.575	0.689	0.942
CHN	3.220	3.244	4.038	*OMN*	0.170	-	-
CIV	0.001	0.000	-	*PAK*	0.279	0.233	0.251
COL	0.075	0.082	-	*PAN*	0.017	0.018	-
CRI	0.040	0.034	-	*PER*	0.116	0.201	0.233
CYP	0.075	0.079	-	*PHL*	0.330	0.414	0.763
CZE	0.200	0.238	0.224	*PNG*	0.004	-	-
DEU	3.447	3.430	3.140	*POL*	0.366	0.405	0.422
DNK	1.322	1.291	0.450	*PRT*	0.473	0.452	0.607
DOM	0.032	0.028	-	*PRY*	0.052	0.017	-
ECU	0.108	0.101	-	*QAT*	0.293	-	-
EGY	0.246	0.181	-	*ROM*	0.030	0.023	0.021
ESP	1.850	1.832	2.192	*RUS*	1.163	1.424	0.768
EST	0.029	0.040	0.058	*SAU*	1.381	1.525	1.103
FIN	0.455	0.443	0.420	*SEN*	0.004	-	-
FRA	2.378	2.241	2.391	*SGP*	0.871	0.900	0.946
GAB	0.007	0.013	-	*SVK*	0.107	0.132	0.222
GBR	5.671	5.592	5.539	*SVN*	0.077	0.092	0.092
GHA	0.020	0.015	-	*SWE*	0.640	0.628	-
GRC	0.468	0.454	0.798	*SWZ*	0.001	-	-
HKG	1.966	2.175	2.234	*THA*	1.454	1.328	1.128
HRV	0.083	0.098	0.080	*TTO*	0.053	-	-
HUN	0.132	0.145	0.101	*TUN*	0.037	-	-
IDN	0.977	1.153	0.988	*TUR*	0.700	0.434	0.611
IND	4.297	4.263	4.647	*UKR*	0.190	0.259	-
IRL	1.390	1.205	1.653	*USA*	18.005	18.294	19.513
ISL	0.070	-	-	*VEN*	0.554	-	-
ISR	0.534	-	-	*VNM*	0.032	0.010	-
ITA	1.757	1.740	1.727	*ZAF*	1.287	1.537	1.250
JOR	0.022	0.035	0.022	*ZAR*	0.024	-	-
JPN	14.319	14.880	14.537	*ZMB*	0.003	0.001	-
KAZ	0.046	0.079	-	*ZWE*	0.036	0.064	0.070
KEN	0.058	0.070	0.071				
Mean	1.019	1.261	1.834				
Mean : *High* − *Income*	1.670	2.060	2.515				
Mean : *Middle* − *High* − *Income*	0.499	0.602	1.023				
Mean : *Middle* − *Low* − *Income*	0.400	0.522	1.220				
Mean : *Low* − *Income*	0.053	0.072	0.074				

Notes: The list includes all countries that are used in the nested logit regression (see Table 6). (1-100%)

Table 8: Nested Logit Marginal Effects

Country	(A)	(B)	(C)	(D)	(E)	Country	(A)	(B)	(C)	(D)	(E)
ARG	−0.016	−0.007	−0.002	−0.027	−0.010	*JPN*	-0.461	−0.219	−0.066	−0.684	−0.264
AUS	−0.126	−0.044	−0.013	−0.153	−0.056	*KAZ*	-0.004	−0.002	−0.001	−0.007	−0.002
AUT	−0.029	−0.011	−0.003	−0.045	−0.016	*KEN*	-0.001	−0.001	0.000	−0.002	−0.001
BEL	−0.027	−0.009	−0.003	−0.040	−0.013	*KOR*	-0.171	−0.082	−0.021	−0.258	−0.099
BGD	−0.002	−0.001	0.000	−0.002	−0.001	*LKA*	-0.008	−0.004	−0.001	−0.012	−0.005
BGR	−0.003	−0.001	0.000	−0.005	−0.002	*LTU*	-0.001	0.000	0.000	−0.001	0.000
BHR	−0.003	−0.001	0.000	−0.005	−0.002	*LUX*	-0.006	−0.002	−0.001	−0.008	−0.003
BHS	−0.004	−0.001	0.000	−0.005	−0.002	*LVA*	-0.001	0.000	0.000	−0.002	−0.001
BOL	0.000	0.000	0.000	−0.001	0.000	*MAC*	-0.003	−0.001	0.000	−0.005	−0.002
BRA	−0.084	−0.039	−0.011	−0.140	−0.048	*MAR*	-0.046	−0.017	−0.006	−0.062	−0.023
CAN	−0.144	−0.051	−0.017	−0.187	−0.071	*MEX*	-0.133	−0.057	−0.016	−0.195	−0.069
CHE	−0.095	−0.039	−0.010	−0.134	−0.052	*MLT*	-0.001	0.000	0.000	−0.001	0.000
CHL	−0.036	−0.015	−0.004	−0.052	−0.024	*MUS*	-0.001	0.000	0.000	−0.001	0.000
CHN	−0.165	−0.069	−0.021	−0.295	−0.092	*MYS*	-0.072	−0.030	−0.009	−0.108	−0.042
CIV	0.000	0.000	0.000	0.000	0.000	*NAM*	0.000	0.000	0.000	0.000	0.000
COL	−0.004	−0.002	−0.001	−0.008	−0.003	*NLD*	-0.045	−0.030	−0.006	−0.072	−0.035
CRI	−0.002	−0.001	0.000	−0.003	−0.001	*NOR*	-0.047	−0.016	−0.005	−0.061	−0.023
CYP	−0.003	−0.001	0.000	−0.004	−0.002	*NZL*	-0.030	−0.009	−0.003	−0.032	−0.012
CZE	−0.009	−0.003	−0.001	−0.015	−0.005	*PAK*	-0.015	−0.007	−0.002	−0.023	−0.008
DEU	−0.126	−0.060	−0.015	−0.186	−0.073	*PAN*	-0.001	0.000	0.000	−0.001	−0.001
DNK	−0.060	−0.016	−0.005	−0.060	−0.026	*PER*	-0.011	−0.005	−0.001	−0.016	−0.006
DOM	−0.001	−0.001	0.000	−0.002	−0.001	*PHL*	-0.031	−0.011	−0.004	−0.040	−0.015
ECU	−0.005	−0.002	−0.001	−0.008	−0.003	*POL*	-0.015	−0.006	−0.001	−0.022	−0.009
EGY	−0.012	−0.005	−0.001	−0.020	−0.007	*PRT*	-0.016	−0.007	−0.002	−0.026	−0.009
ESP	−0.067	−0.030	−0.008	−0.109	−0.034	*PRY*	-0.001	0.000	0.000	−0.002	−0.001
EST	−0.002	−0.001	0.000	−0.002	−0.001	*ROM*	-0.001	0.000	0.000	−0.003	−0.001
FIN	−0.018	−0.006	−0.002	−0.025	−0.009	*RUS*	-0.081	−0.029	−0.009	−0.130	−0.040
FRA	−0.082	−0.032	−0.010	−0.141	−0.046	*SAU*	-0.051	−0.019	−0.006	−0.078	−0.030
GAB	−0.001	0.000	0.000	−0.001	0.000	*SGP*	-0.030	−0.013	−0.003	−0.047	−0.019
GBR	−0.208	−0.081	−0.023	−0.274	−0.105	*SVK*	-0.005	−0.002	0.000	−0.008	−0.003
GHA	−0.001	0.000	0.000	−0.002	−0.001	*SVN*	-0.003	−0.001	0.000	−0.005	−0.002
GRC	−0.016	−0.007	−0.002	−0.027	−0.009	*SWE*	-0.025	−0.010	−0.003	−0.037	−0.012
HKG	−0.071	−0.032	−0.008	−0.104	−0.040	*THA*	-0.069	−0.031	−0.009	−0.101	−0.040
HRV	−0.004	−0.002	0.000	−0.005	−0.002	*TUR*	-0.026	−0.010	−0.003	−0.038	−0.014
HUN	−0.006	−0.002	−0.001	−0.009	−0.003	*UKR*	-0.018	−0.007	−0.002	−0.032	−0.010
IDN	−0.079	−0.030	−0.010	−0.107	−0.041	*USA*	-0.619	−0.216	−0.077	−0.781	−0.302
IND	−0.233	−0.110	−0.032	−0.326	−0.128	*VNM*	-0.001	0.000	0.000	−0.001	0.000
IRL	−0.046	−0.015	−0.004	−0.061	−0.022	*ZAF*	-0.088	−0.038	−0.010	−0.113	−0.044
ITA	−0.067	−0.029	−0.008	−0.105	−0.033	*ZMB*	0.000	0.000	0.000	0.000	0.000
JOR	−0.002	−0.001	0.000	−0.003	−0.001	*ZWE*	-0.002	0.000	0.000	−0.002	−0.001
Mean	−0.050	−0.021	−0.006	−0.071	−0.027						
Mean : *High* −*Income*	−0.072	−0.029	−0.009	−0.101	−0.038						
Mean : *Middle* −*High* −*Income*	−0.032	−0.014	−0.004	−0.050	−0.018						
Mean : *Middle* −*Low* −*Income*	−0.032	−0.014	−0.004	−0.045	−0.017						
Mean : *Low* −*Income*	−0.002	−0.001	0.000	−0.002	−0.001						

Notes: The list includes all countries that are used in the conditional logit model (see Table 6 for model specification). Column A: Marginal effect of a one percentage point increase in the average labor income tax rate. Column B: Marginal effect of a one percentage point increase in the tax system's degree of progressivity. Column C: Marginal effect of a one percentage point increase in the corporate tax rate. Column D: Marginal effect of a one percentage point increase in the employer-based social security rate. Column E: Marginal effect of a one percentage point increase in the employee-based social security contribution.