Research Article

Julio López-Laborda and Fernando Rodrigo*

Mobility of Top Income Taxpayers in Response to Regional Differences in Personal Taxes: Evidence from Spain

https://doi.org/10.1515/econ-2022-0016
received December 01, 2020; accepted January 12, 2022

Abstract: The study empirically tests whether regional differences in personal taxes (Personal Income Tax, Wealth Tax, and Inheritance and Gift tax) have had some influence on the decision of the richest Spanish taxpayers to change their residence. The estimates use the Personal Income Tax (IRPF) Panel database provided by the Ministry of Public Finance. The study offers evidence that regional tax differences affect the decision to change residence of the top income taxpayers and also that this decision is also affected by other attractiveness and opportunity factors offered by the regions, and by certain characteristics of the individuals. However, the marginal effects are very slight, except for the coefficient of the variable showing regional differences in IRPF: If the difference between average regional IRPF rates increases by 10 percentage points in favour of the other regions, the probability of a top 1% taxpayer changing its residence increases by 11.2 percentage points. The study also documents the importance of the Community of Madrid in the relocation decisions of rich taxpayers. Finally, the study finds that the behaviour of taxpayers aged 65 years and over in the top 1% does not seem very different from that of all taxpayers in the same income bracket.

Keywords: migration, top income, regions, personal income, wealth taxes

1 Introduction

Since 1997, the Spanish "common regime" autonomous communities (hereinafter, ACs) have had the power to decide what tax rates (as well as certain allowances and tax credits) to apply in some taxes assigned to them by the state, called "ceded taxes".[1] They used this power immediately and extensively on indirect taxes, such as Capital Transfer Tax, Taxes on Gambling, or more recently, the Hydrocarbons Retail Sales Tax, but were much more reluctant to use it on direct taxes, except for Inheritance and Gift Tax. In particular, regional tax rates were not generally applied to autonomic personal income tax until the start of the recent Great Recession.

Individuals may react to the different regional tax policies by moving from one region to another. If this mobility is directed, as in the Tiebout (1956) model, to obtain a basket of taxes and public services (such as education, healthcare, and infrastructure) that better suits their preferences, the differences in tax policy of the regional governments will not have efficiency or equity costs. But if the migration is directed exclusively to benefit from lower taxes, Gordon (1983) has already warned that tax decisions made by uncoordinated governments can create multiple externalities, affecting efficiency, and income distribution. To correct these distortions, some form of harmonisation of regional taxes may be necessary, agreed by the regions themselves or imposed by the central level (Boadway & Shah, 2009).

There is very little research on the mobility of citizens in response to tax rate differences between jurisdictions in Spain. Leal, López-Laborda, and Rodrigo (2009) offer evidence that regional differences in the Hydrocarbons Retail Sales Tax influence the choice of the region for

* **Corresponding author: Fernando Rodrigo,** Department of Applied Economics and Instituto Universitario de Investigación en Empleo, Sociedad Digital y Sostenibilidad (IEDIS), University of Zaragoza, Gran Vía, 2, 50005-Zaragoza, Spain, e-mail: frodrigo@unizar.es
Julio López-Laborda: Department of Applied Economics, University of Zaragoza, Gran Vía, 2, 50005-Zaragoza, Spain, e-mail: julio.lopez@unizar.es
ORCID: Fernando Rodrigo 0000-0003-1534-2970; Julio López-Laborda 0000-0002-1539-8483

1 Navarre and the Basque Country are "special regime" or "foral" autonomous communities. See López-Laborda and Monasterio (2007) and Zabalza and López-Laborda (2011, 2017) for a detailed description of the common and foral systems of regional finance.

purchasing fuel. However, Leal, López-Laborda, and Rodrigo (2014) find no evidence that differences in regional gambling taxes have any influence on the choice of the region for gambling. Recently, Agrawal and Foremny (2019) have shown that regional differences in Spanish personal income tax affect the mobility of the richest taxpayers. In this study, our purpose is to extend the research to the two main personal taxes, in addition to Personal Income Tax (*Impuesto sobre la Renta de las Personas Físicas*, IRPF): Wealth Tax (*Impuesto sobre el Patrimonio*, IP) and Inheritance and Gift Tax (*Impuesto sobre Sucesiones y Donaciones*, ISD). At present, there are significant differences between these three taxes in some ACs. For example, while the 2019 regional IRPF tax rate in Catalonia on incomes over 175000.20 euros was 25.50%, in Madrid the tax rate was 21%.[2] Also, unlike Catalonia, Madrid does not impose IP. Our hypothesis is that the decision of individuals to change their residence (especially if they are high-income and above a certain age) will be determined by all the taxes related to their residence and not only by the Personal Income Tax.

Therefore, our aim is to test whether regional differences in these three taxes affect taxpayers' decision to change residence, controlling at the same time for other factors relating to differences in attractiveness and the economic opportunities offered by each region (such as public spending, infrastructure, housing prices, or the productive structure) and certain personal characteristics (such as age or marital status). We will focus on the taxpayers with the greatest economic ability (the "top 1% incomes"), as they will be more aware of the tax burden of each AC, benefit more from a change of residence, and enjoy more opportunities to make such a change. Because of the available information, we will limit our study to the fifteen ACs under the common regime and to the autonomous cities of Ceuta and Melilla. The latter are a hybrid of regional and local governments, although they cannot exercise any power over the three taxes that we are going to analyse.

There is an extensive literature investigating this topic. In Switzerland, Kirchgässner and Pommerehne (1996) find that tax competition between cantons over income tax has some influence on the choice of residence of the richest taxpayers. Using municipal data, Liebig, Puhani, and Sousa-Poza (2007) obtain evidence that young college graduates are most sensitive to income tax rate differences. Brülhart and Parchet (2014) conclude that wealthy retirees do not respond to differences in bequest tax between cantons. Brülhart, Gruber, Krapf, and Schmidheiny (2021) find evidence that reported wealth holdings in Switzerland are very sensitive to cantonal differences in wealth taxation, with part of this effect being due to taxpayer mobility.

Day and Winer (2006) study the influence of federal and provincial policies on migration between Canadian provinces, finding a reduced effect of both taxes and spending. For Australia, Grossman (1990) shows that the population of Queensland grew in the three years following the abolition of the tax in 1976, due to the migration of residents in the other five states. By 1983, all states had eliminated the so-called "death tax."

In the United States, Bakija and Slemrod (2004) conclude that state taxes have a significant but modest negative impact on the number of federal estate tax returns filed in a state, and thus, on the real or reported residence of older wealthy people. Coomes and Hoyt (2008) show that differences in state income taxes lead to mobility in metropolitan areas which belong to more than one state, but only when those differences are relatively large. Young, Varner, Lurie, and Prisinzano (2016) obtain evidence that American millionaires respond to differences in effective federal plus state income tax rates, although, first, the size of the response is small, and second, mobility is exclusively towards Florida, and not towards any other state with low tax rates. Moretti and Wilson (2019) find that the number of the ultra-wealthy billionaires (Forbes 400 richest Americans) in states with estate taxes fell by 35% after 2001 compared to states that do not maintain this tax, and this effect increases with the age of the ultra-wealthy individuals. Moretti and Wilson (2017) document a large, stable effect of state personal and corporate income taxes on the migration patterns of "star" scientists. Akcigit, Grigsby, Nicholas, and Stantcheva (2022) reiterate the same result for US inventors, especially if they develop their work as employees of a company.

Finally, Kleven, Landais, Muñoz, and Stantcheva (2020) offer a complete survey of this growing literature on the effects of personal income taxation on residential mobility and a discussion about the possible implications in the future design of tax policies.

The above literature is related with that which studies the international mobility of the wealthiest taxpayers (see Kleven, Landais, and Saez, 2013, for footballers in the European leagues; Kleven, Landais, Saez, and Schultz, 2014, for high-income foreigners in Denmark; Akcigit, Baslandze, and Stantcheva, 2016, for "superstar" inventors; and Schmidheiny and Slotwinski, 2018, for high-income foreigners in Switzerland).

2 The territory of the Autonomous Community of Madrid is the same as the Province of Madrid. One of the 179 municipalities in the Autonomous Community is the city of Madrid itself, the national capital.

For the case of Spain, Agrawal and Foremny (2019) investigate whether regional differences in personal income tax have affected the mobility of the richest 1%. Their database is the Continuous Working Lives Sample (*Muestra Continua de Vidas Laborales*), published by the Ministry of Employment and Social Security, for 2005–2014. With aggregated regional data, the authors obtain an elasticity of the stock of rich taxpayers with respect to the net-of-tax rates of 0.85. With individual data, the research concludes that a 1% increase in the net-of-tax rate for an AC relative to others increases the probability of moving to that region by 1.7% points. Agrawal and Foremny (2019) also test for response differences by occupation and industry and measure the implications of mobility for tax revenue.

Our approach differs in several aspects from that of Agrawal and Foremny (2019). First, as we explain above, we include in our analysis two taxes which, alongside the IRPF, may influence the mobility decisions of the richest taxpayers: IP and ISD. Second, our database is the IRPF Panel, provided by the Institute for Fiscal Studies (*Instituto de Estudios Fiscales*, Ministry of Public Finance and Public Administration). It is as an expanded panel, in which each annual sample is representative of the population in the common regime ACs (plus Ceuta and Melilla) reporting IRPF in that year. The cross-sections corresponding to the different years have been obtained by stratified sampling, the strata being the region of residence, the source of income and the income level. The IRPF Panel provides information on all income declared by taxpayers residing in Spain, regardless of its source (employment, movable capital, real estate, capital gains, and business and professional activities), on the tax liability they actually paid, and on some personal characteristics, such as sex, age, marital status, descendants, or city of residence. The first year covered by the Panel is 1982.

Third, the information provided by the IRPF Panel allows us to identify more precisely the taxpayers in the highest income brackets. The database used by Agrawal and Foremny (2019) only provides information on labour and self-employment income, but not on income from movable capital, real estate and capital gains, which constitute a very significant percentage of the income of the richest: 30% of the tax base of the top 1% and 42% of that of the top 0.1%, according to our database.

Fourth, as we will explain below, we try to identify the explanatory factors of the decision of the richest taxpayers to change or not their residence, but not the choice of a given destination region, as in Agrawal and Foremny (2019). And fifth, we complete the baseline estimate for the top 1% with the following additional estimates: (i) for the taxpayers in the top 0.1%; (ii) excluding taxpayers resident in Madrid from both of the above samples, in order to test for the importance of this region as a migration destination from other regions; and (iii) for taxpayers aged 65 or over in the top 1% and top 0.1%, in order to determine whether, in line with the literature, ISD especially affects their residence decisions.

The study is organised as follows. The second section summarises regional differences between the three taxes in our analysis. The third section describes the specification and the database used, and the fourth section presents and discusses the results of our estimates. We perform Logit/Probit estimates in which the dependent variable shows whether a taxpayer has changed residence between 2006 and 2012, and there are three types of independent variables frequently considered in related literature: taxes, attractiveness and opportunities, and sociodemographics. The study offers evidence that regional tax differences affect the decision to change residence of the top income taxpayers and that this decision is also affected by other attractiveness and opportunity factors of the regions and by certain characteristics of the individuals. Furthermore, mobility due, especially, to differences in capital taxation, and also in IRPF for the top 0.1% taxpayers, seems to flow mainly to the Madrid region. Finally, the study finds some specificities in the behaviour of taxpayers in the top 0.1%. The study ends with some concluding remarks.

2 Regional Differences in Personal Income Tax, Wealth Tax, and Inheritance and Gift Tax

Since the early 1980s, the Spanish ACs receive the revenue of certain taxes transferred by the central government, called "ceded taxes," including 100% of the IP and ISD revenue accrued in their territories, as well as certain management competences. But only since 1997, several degrees of discretion were granted to regions *vis-à-vis* some of the ceded taxes, allowing ACs to set tax rates and establish tax credits and allowances in IP and ISD (among other taxes).[3] Powers over the IP correspond to

3 Durán-Cabré, Esteller-Moré, and Salvadori (2015) find that, prior to acquiring regulatory powers in ceded taxes, ACs were competing in their audit policies. Once ACs acquired regulatory powers in those taxes, competition in audit policies seems to partly change to a competition in regulatory tax parameters.

the AC of residence of the owner of the taxed wealth. Spanish legislation considers that individuals reside in a certain AC when they stay there for a greater number of days in the year and, in particular, when their primary residence is located in that AC. The rules in the ISD are more elaborate, precisely, to hinder changes of residence for tax reasons. Powers in this tax correspond to the AC in which the transferor (in inheritances) or the beneficiary (in donations) has stayed the greatest number of days in the last five years, or to the AC where the property is located, in the case of donations of real property.

Table 1 shows the maximum tax rates set by ACs in the IP in the period 2006–2012 and in 2019. Some regions have also established their own allowances and tax credits. It is true that to make decisions about changes of residence, the relevant tax rates are the average rather than marginal ones, but ACs differ mostly in the higher marginal rates they set, so the figures in this table (and Table 3) give a fairly accurate idea of the tax differences between ACs.

As the table shows, in 2006 and 2007 there was hardly any difference in the IP between regions: only Cantabria had raised the free tax allowance and top marginal rate significantly. Between 2008 and 2010, the tax was abolished by the central government, which reintroduced it in 2011. In this last year, the only notable changes were the effective elimination of the tax in the Balearic Islands, Madrid, and the Valencian Community, by applying a 100% rebate. By 2019, there are already significant disparities among the maximum tax rates, from 2.5 to 3.75%. Also, La Rioja applies a 75% rebate, and Madrid maintains the full rebate.

For the ISD, it is not easy to find a synthetic indicator of the differences between ACs. Nor do we believe that it is possible to calculate the tax rate borne by a hypothetical taxpayer in each AC. The Spanish tax is not an estate tax, but a tax on inheritances, i.e. acquisitions, and depends on factors such as the composition of the estate, the number of heirs and their relationship to the transferor or the heirs' own wealth. All these factors differ between individuals and between regions, and ACs have the power to regulate all these factors in their respective ISD. In Table 2 we have opted to show whether the ACs have eliminated, in practice, the tax on inheritance for the close relatives, without imposing any quantitative limit. In the applied exercise we will also construct a variable based on this information.

Table 2 shows that in 2006, Cantabria and La Rioja had effectively eliminated taxes on inheritance for the close relatives, and by 2019 seven ACs had done the same. Meanwhile, the autonomous cities of Ceuta and Melilla do not enjoy regulatory powers over the ISD, but state regulations for these territories establish a deduction of 99% of the tax when the heirs are the spouse, parents, or children of the deceased.

From 1994, the ACs received a share of 15% of the IRPF paid by residents in their respective territories. After 1997, a further 15% was assigned by the central level to the regions as a "ceded tax," like the IP and ISD. The

Table 1: Maximum tax rate (%) in Wealth Tax by autonomous community, 2006–2012 and 2019

Autonomous community	2006	2007	2008	2009	2010	2011	2012	2019
Catalonia	2.50	2.50	0.00	0.00	0.00	2.50	2.75	2.75
Galicia	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Andalusia	2.50	2.50	0.00	0.00	0.00	2.75	3.03	3.03
Asturias	2.50	2.50	0.00	0.00	0.00	2.50	3.00	3.00
Cantabria	3.00	3.00	0.00	0.00	0.00	2.50	2.50	3.03
La Rioja	2.50	2.50	0.00	0.00	0.00	2.50	2.50	0.625
Murcia	2.50	2.50	0.00	0.00	0.00	2.50	2.50	3.00
Valencian Community	2.50	2.50	0.00	0.00	0.00	0.00	2.50	3.12
Aragon	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Castile-La Mancha	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Canary islands	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Extremadura	2.50	2.50	0.00	0.00	0.00	2.50	3.75	3.75
Balearic Islands	2.50	2.50	0.00	0.00	0.00	0.00	2.50	3.45
Madrid	2.50	2.50	0.00	0.00	0.00	0.00	0.00	0.00
Castile and Leon	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Ceuta	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Melilla	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50
Standard deviation	0.12	0.12	0.00	0.00	0.00	0.99	0.72	0.93

Source: Ministry of Public Finance and Public Administration (2006–2019).

Table 2: Autonomous communities which have effectively eliminated Inheritance Tax for the close relatives, with no quantitative limits, 2006–2012 and 2019

Autonomous community	2006	2007	2008	2009	2010	2011	2012	2019
Catalonia	NO	NO	NO	NO	NO	YES	YES	NO
Galicia	NO	NO	NO	NO	NO	NO	NO	NO
Andalusia	NO	NO	NO	NO	NO	NO	NO	YES
Asturias	NO	NO	NO	NO	NO	NO	NO	NO
Cantabria	YES	YES	YES	YES	NO	NO	YES	YES
La Rioja	YES	YES	YES	YES	YES	YES	YES	YES
Murcia	NO	NO	NO	NO	NO	NO	NO	YES
Valencian Community	NO	YES	YES	YES	YES	YES	YES	NO
Aragon	NO	NO	NO	NO	NO	NO	NO	NO
Castile-La Mancha	NO	NO	YES	YES	YES	YES	YES	NO
Canary Islands	NO	NO	YES	YES	YES	YES	NO	YES
Extremadura	NO	NO	NO	NO	NO	NO	NO	YES
Balearic Islands	NO	YES	YES	YES	YES	YES	YES	NO
Madrid	NO	YES	YES	YES	YES	YES	YES	NO
Castile and Leon	NO	YES	YES	YES	YES	YES	YES	YES
Ceuta	YES	YES	YES	YES	YES	YES	YES	YES
Melilla	YES	YES	YES	YES	YES	YES	YES	YES

Source: Ministry of Public Finance and Public Administration (2006–2019).

assigned percentage was increased to 33% from 2002 (when the initial 15% tax sharing disappeared) and to 50% from 2009. Central government has the competence to regulate the tax base, that is common to central and regional (ceded) IRPF and to manage both taxes. The regions have the power to legislate on the regional tax rate and certain regional tax credits. This way, the ACs can regulate the regional tax schedule that is applied on the general taxable base (income from wages and salaries, real estate, and business and professional activities) but not the tax schedule that is applied to the savings taxable base (movable capital income and capital

Table 3: Regional plus central maximum tax rate (%) for the general tax base in Personal Income Tax, 2006–2012 and 2019

Autonomous community	2006	2007	2008	2009	2010	2011	2012	2019
Catalonia	45.00	43.00	43.00	43.00	43.00	49.00	49.00	48.00
Galicia	45.00	43.00	43.00	43.00	43.00	45.00	45.00	45.00
Andalusia	45.00	43.00	43.00	43.00	43.00	48.00	49.00	47.40
Asturias	45.00	43.00	43.00	43.00	43.00	48.50	48.50	48.00
Cantabria	45.00	43.00	43.00	43.00	43.00	48.00	48.00	48.00
La Rioja	45.00	43.00	42.90	42.90	42.90	44.90	44.90	48.00
Murcia	45.00	43.00	43.00	42.98	43.00	47.00	47.00	45.80
Valencian Community	45.00	43.00	42.98	42.98	42.98	44.98	47.00	48.00
Aragon	45.00	43.00	43.00	43.00	43.00	45.00	45.00	47.50
Castile-La Mancha	45.00	43.00	43.00	43.00	43.00	45.00	45.00	45.00
Canary Islands	45.00	43.00	43.00	43.00	43.00	45.00	46.08	46.50
Extremadura	45.00	43.00	43.00	43.00	43.00	48.00	48.00	47.50
Balearic Islands	45.00	43.00	43.00	43.00	43.00	45.00	45.00	47.50
Madrid	45.00	42.90	42.90	42.90	42.90	44.90	44.90	43.50
Castile and Leon	45.00	43.00	43.00	43.00	43.00	45.00	45.00	44.00
Ceuta	45.00	43.00	43.00	43.00	43.00	45.00	45.00	45.00
Melilla	45.00	43.00	43.00	43.00	43.00	45.00	45.00	45.00
Standard deviation	0.00	0.02	0.03	0.03	0.03	1.57	1.62	1.58
Central government	29.16	27.13	27.13	27.13	21.50	23.5	23.5	22.5

Source: Ministry of Public Finance and Public Administration (2006–2019).

gains) which is regulated by the central level and is the same throughout the country.

The ACs have made frequent use of their powers to establish tax credits on regional IRPF (with a very minor effect in the tax collection), but, as can be seen in Table 3, it was the Great Recession which impelled them to intervene on the regional tax schedule, in general, in order to increase tax revenue. As the table shows, in 2006, all the ACs applied the same regional tax schedules. In 2007, Madrid reduced the regional maximum rate minimally. In the following three years it was followed by La Rioja, Valencian Community, and Murcia. However, in 2011 there was a start of notable differences between ACs: La Rioja and Madrid were the ACs with the lowest regional maximum marginal rate (21.4%), and Catalonia and Andalusia the ones with the highest (25.5%). By 2019, most ACs had increased their maximum tax rate. Five regions already apply 25.5%, while Madrid has lowered it to 21%.

In the following sections, we will try to empirically determine whether regional differences in these three personal taxes – IRPF, IP, and ISD – have influenced the choice of residence of top income taxpayers.

3 Specification and Database

Our conceptual framework is the one usually employed in the literature (see, for example, Bakija and Slemrod, 2004 or Schmidheiny and Slotwinski, 2018). The utility an individual obtains by residing in a given region depends negatively on the taxes he/she pays there (in our case, IRPF, IP, and ISD) and positively on the attractiveness of the region and the opportunities it offers, which will relate to factors like housing prices, public services, income, or its productive structure. Therefore, the probability of the individual deciding to change residence will increase if he/she obtains more utility in other regions. The observations in our database do not have sufficient statistical variability (since we only have 17 different tax jurisdictions as a possible destination) to obtain reliable results when estimating the probability of changing residence from one to another specific region, so we must limit ourselves to formalising the decision to change residence, regardless of the destination region. Our hypothesis is that the probability of an individual in the top 1% deciding to change his/her region of residence will increase if the average taxes paid in the other regions are less than those paid in the region of residence.

Therefore, the general specification we want to estimate is as follows:

$$CHANGE_i = X_i\beta + Z_i\phi + u_i, \quad (1)$$

where *CHANGE* is the endogenous variable, X represents the set of relevant tax variables (differences in the tax rates borne by each taxpayer on IRPF, IP, and ISD in the different ACs), and Z is a set of control variables (differences in residential attractiveness and opportunities enjoyed, and individual characteristics), traditionally considered in the literature as possible causes of a change in residence.

CHANGE takes the value 1 if the AC where the taxpayer is resident in 2006 is not the same in 2012 (i.e., the taxpayer has changed his/her residence) and 0 otherwise. We take 2006 as the base year because, as we have seen in Tables 1 and 3, in that year the ACs did not regulate either IRPF or IP differently, so taxation would have little effect on taxpayers' residence that year. However, in 2012 there are already clear tax differences between ACs in the three taxes. In the database, *CHANGE* takes the value 1 for 877 observations, meaning 4% of the top incomes selected moved to another region between those two years. Extrapolating the figures of the IRPF Panel to the population as a whole (using for that purpose the elevation factor provided by the Panel), the percentage of migration among the richest taxpayers is 3.74%.

Table 4 shows the regions of origin (in 2006) and destination (in 2012) of taxpayers in the top percentile, with population data. We can see that 59.3% of all migration flows to the Community of Madrid. More specifically, 45.6% of migration to Madrid comes from two regions which are not adjacent to it: Andalusia and Catalonia. The second region in terms of receiving rich taxpayers is the Valencian Community, with 8.7%.

The same table shows that five regions maintain a positive balance in the difference between high-income taxpayers entering and leaving in the analysed period: the Balearic Islands, the Canary Islands, Cantabria, the Valencian Community, and Madrid. Thus, this descriptive information already reveals a spatial concentration in the destinations of high-income migration, particularly in the Madrid region.

Table 5 contains the same information on origin and destination regions, but in this case, for the other 99% of taxpayers. The migration patterns of this group are very different to those of the richest taxpayers. First, the migration percentage among taxpayers in the 99%, always in terms of population, is 2.04%, just over half the migration percentage among the richest cohort.

Second, Madrid is still the region receiving the largest share of migration, but this percentage has now

Table 4: Number of changes of residence among top-percentile taxpayers between the source region "i" (residence in 2006, column 1) and the destination region "j" (residence in 2012, row 1). Population data*

	Andalusia	Aragon	Asturias	Balearic Islands	Canary Islands	Cantabria	Castile-La Mancha	Castile and Leon	Catalonia	Extremadura	Galicia	Madrid	Murcia	La Rioja	Valencian C.	Ceuta	Melilla	Total exits from region 'i'
Andalusia		5	9	5	30	0	5	1	10	8	11	748	9	1	25	4	5	**876**
Aragon	4		4	0	0	9	1	5	19	0	0	71	0	0	46	0	0	**159**
Asturias	1	0		10	12	12	0	0	22	0	14	125	0	0	10	2	0	**208**
Balearic Islands	4	0	0		2	0	1	0	19	0	0	61	0	0	11	0	0	**98**
Canary Islands	32	0	0	2		0	0	1	2	1	18	60	0	0	0	0	0	**116**
Cantabria	0	0	9	0	0		0	2	0	0	0	41	0	0	10	0	0	**62**
Castile-La Mancha	0	0	0	0	15	0		1	2	0	1	299	3	0	37	0	0	**358**
Castile and Leon	26	1	18	0	4	3	13		35	1	17	270	1	0	8	0	0	**397**
Catalonia	17	20	12	95	5	9	7	9		4	6	458	3	9	111	0	0	**765**
Extremadura	39	0	0	0	10	0	1	11	4		0	93	3	0	4	0	0	**165**
Galicia	17	0	0	0	4	19	0	12	0	0		169	0	0	4	0	0	**225**
Madrid	57	9	25	54	30	20	62	71	79	10	100		20	0	68	0	0	**605**
Murcia	2	0	3	0	0	0	0	0	4	0	0	90		0	52	0	0	**151**
La Rioja	0	0	0	0	10	0	0	1	1	0	0	7	0		0	0	0	**19**
Valencian Community	14	8	0	10	0	0	27	1	18	0	0	130	20	1		0	0	**229**
Ceuta	1	0	0	2	0	0	0	0	0	0	0	10	0	0	0		0	**13**
Melilla	1	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0		**11**
Total entries to region 'j'	**215**	**43**	**80**	**178**	**122**	**72**	**117**	**115**	**215**	**24**	**167**	**2,642**	**59**	**11**	**386**	**6**	**5**	4,457

*Shaded in grey, the regions with more high-income taxpayers entering in 2012 than leaving (after residing there in 2006).
Source: By the authors, based on the IRPF Panel.

fallen from 59.3 to 22.8%. Madrid receives taxpayers especially from Andalusia and the neighbouring regions of Castile-La Mancha and Castile and Leon. The next region in terms of receiving taxpayers outside the richest percentile is Castile-La Mancha, with 13.6% of all migrations. Three quarters of the people moving to this region come

Table 5: Number of changes of residence among non-top-percentile taxpayers between the source region "i" (residence in 2006, column 1) and the destination region "j" (residence in 2012, row 1). Population data*

	Andalusia	Aragon	Asturias	Balearic Islands	Canary Islands	Cantabria	Castile-La Mancha	Castile and Leon	Catalonia	Extremadura	Galicia	Madrid	Murcia	La Rioja	Valencian Community	Ceuta	Melilla	Total exits from region 'i'
Andalusia		672	427	1,266	1,520	373	2,220	715	2,778	761	793	10,121	1,493	241	2,213	518	449	**26,560**
Aragon	430		173	484	141	103	304	493	1,718	182	188	1,038	83	273	671	0	0	**6,281**
Asturias	479	57		293	386	435	80	1,326	568	58	638	2,196	91	52	506	0	0	**7,165**
Balearic Islands	1,489	147	62		172	51	154	880	1,096	222	257	976	133	0	570	0	0	**6,209**
Canary Islands	1,679	434	300	262		90	284	949	1,113	140	1,826	1,926	358	53	775	96	77	**10,362**
Cantabria	305	242	582	205	163		143	725	180	2	200	1,533	46	104	125	0	0	**4,555**
C.-La Mancha	1,513	278	326	345	220	170		791	491	251	245	12,136	629	0	2,422	53	145	**20,015**
C. and Leon	1,572	594	1,409	252	746	1,064	957		1,843	453	1,387	10,983	152	205	1,395	37	139	**23,188**
Catalonia	7,293	4,257	1,161	2,475	1,650	350	907	2,485		865	2,671	5,024	809	553	4,204	18	95	**34,817**
Extremadura	1,372	354	117	154	360	0	714	453	365		142	3,451	241	32	533	0	0	**8,288**
Galicia	1,142	449	1,238	245	898	86	552	927	960	129		3,543	181	95	969	37	48	**11,499**
Madrid	9,666	1,399	2,348	1,344	2,291	1,172	26,976	9,844	3,041	2,173	3,734		1,291	395	5,077	125	109	**70,985**
Murcia	1,395	0	230	168	140	82	337	312	246	44	294	1,524		169	2,285	0	27	**7,253**
La Rioja	168	457	38	0	64	94	13	388	113	0	166	371	0		269	0	0	**2,141**
Valencian C.	1,893	936	901	1,002	243	251	1,909	1,547	2,883	334	841	4,275	1,986	52		127	97	**19,277**
Ceuta	1,106	54	0	35	33	0	0	29	45	76	48	356	18	0	84		0	**1,884**
Melilla	775	57	0	57	100	0	0	49	98	32	93	287	116	0	201	87		**1,952**
Total entries to region 'j'	**32,277**	**10,387**	**9,312**	**8,587**	**9,127**	**4,321**	**35,550**	**21,913**	**17,538**	**5,722**	**13,523**	**59,740**	**7,627**	**2,224**	**22,299**	**1,098**	**1,186**	262,431

*Shaded in grey, the regions with more high-income taxpayers entering in 2012 than leaving (after residing there in 2006).
Source: by the authors, based on the IRPF Panel.

from Madrid: it is probable that the improvements of communications between Madrid and Castile-La Mancha, together with a lower housing price in this last AC, have encouraged the change of residence (although not necessarily that of the workplace) from Madrid to the neighbouring region.

Finally, Table 5 also shows that unlike the results for the richest taxpayers, Madrid is not a net receiver of the 99%.

The construction of the explanatory variables is described in detail below.

3.1 Tax Variables

– *DIFIRPF*: A variable which measures the difference between the average rate of the regional IRPF borne by each taxpayer in 2011, if still resident in the same region as in 2006, and the mean of the average rates of the regional IRPF that would be borne by that taxpayer if resident in each of the remaining regions, also in 2011. To carry on the above, we have calculated seventeen alternative tax liabilities for each taxpayer: that corresponding to his/her AC of residence in 2006, and those corresponding to the rest of possible alternative locations, using the regional IRPF tax schedules approved for 2011.

  The literature on tax-induced mobility is concerned with the potential problem of endogeneity, especially of tax variables. We do not think this is a serious problem in our estimates, for the following reasons. First, the low weight of rich migrants in the electorate (only 3.74% of the top 1% moves) implies that they are not a determining factor in setting the level of regional tax rates in the destination region (Agrawal and Foremny, 2019; Kirchgässner and Pommerehne, 1996). Second, as explained above, we do not use the tax rate in the AC of destination to construct the variable *DIFIRPF* but the average of tax rates in all ACs other than that of origin. In any case, in all the variables of our specification (not only the fiscal ones) we used the year 2011 instead of 2012, which would contribute to further mitigate the endogeneity problems, if they exist. Note that, as Tables 1 and 3 show, until 2011 there are no significant differences between ACs in IRPF and IP and that 42% of changes in residence in our sample occur between 2011 and 2012 (and 53% since 2010).

  We expect a positive sign for the coefficient of the variable *DIFIRPF* in our proposed estimates: The greater the difference observed between both tax rates, the greater the incentive will be to change the region of residence. A first evidence of the relocation of taxpayers from the regions with high IRPF tax rates to the regions with low IRPF rates is found in Figure 1 in which we can appreciate how the distribution of changes in residence is clearly shifted to the right (i.e., where the values of *DIFIRPF* are strictly positive).

– *DIFISD*: A variable measuring differences in the ISD between ACs. First, we constructed a binary variable taking the value 1 for the seven regions which, according to Table 2, still maintained a certain level of ISD taxation for close relatives in 2011, and 0 when this tax is effectively eliminated. Next, we constructed the variable *DIFISD*, which shows the difference for each taxpayer between the 2011 ISD regime in their original region (0/1) and the average for the same year across all other ACs.

  In accordance with the literature, this tax incentive could be more important to older individuals, who are likely to show more interest in the tax planning of their inheritance as they get older. So, we present this variable in the estimates interacted with the taxpayer's age: *AGE*DIFISD*. Consequently, we expect a positive sign for the coefficient of this variable.

– *DIFCAPITALTAXATION*: This variable measures regional differences in the main taxes on capital in Spain. On one hand, individuals' net wealth is taxed by the IP, a tax in which, as we have seen, ACs can exercise their tax powers. On the other hand, capital income (except real estate income) is taxed in the IRPF via the savings tax schedule, where ACs cannot exercise any power, as we have also explained above. We have added both taxes for each taxpayer and then constructed a variable which measures the differences between regions. Next, we explain the procedure followed to construct this variable.

  The main problem we found when constructing this variable is that the IRPF Panel does not provide direct information on the value of the assets and liabilities owned by IRPF taxpayers. To deal with this problem, we simulated the value of the net wealth for each taxpayer using another source of information. For 2007 only,[4] we have been provided with a sub-sample of IP returns corresponding to taxpayers included in the IRPF Panel. With this sub-sample, we first estimate individual wealth based on taxpayer's income not derived from capital gains, income from capital gains, and the region of residence: The details of this estimation are in the Annex A of this

4 2007 was the last fiscal year in which the free tax allowance in IP was set at a relatively low level in almost all the regions: €108182.18. As a consequence, there was a relatively large number of taxpayers.

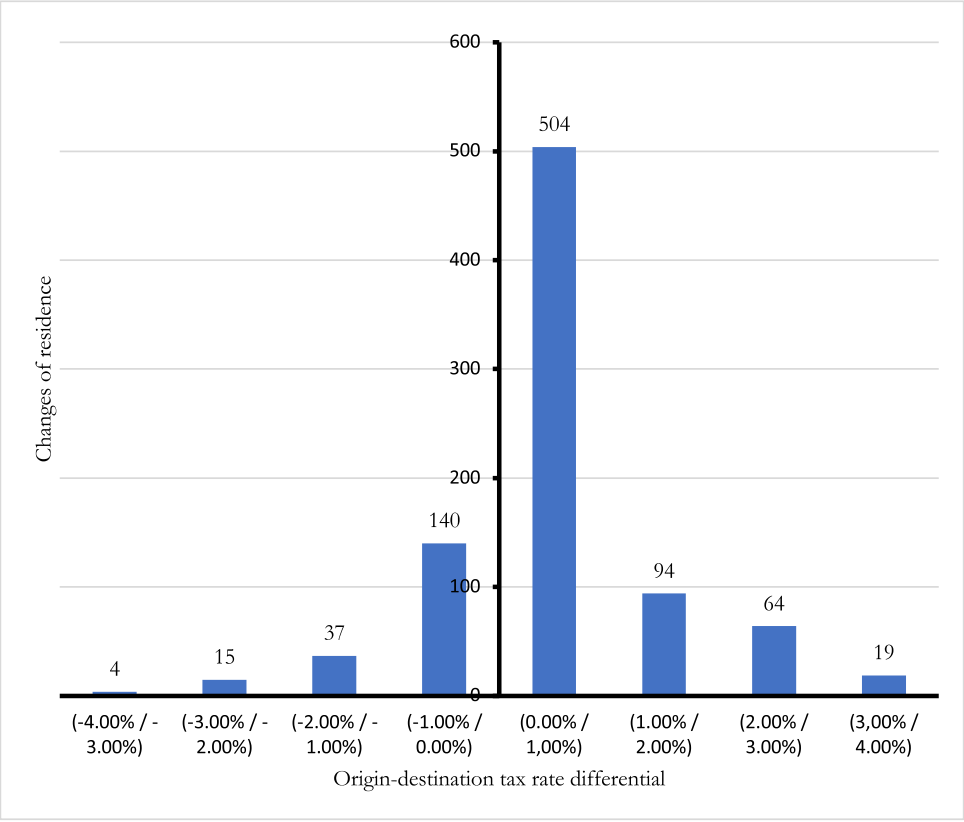

Figure 1: Distribution of changes of residence according to the difference in IRPF average rates between the regions of origin (in 2006) and destination (in 2012).

study. Next, the coefficients obtained in that regression are used to impute the net wealth of each taxpayer in the IRPF Panel.

Once we have this imputation of individual net wealth, we calculate the IP paid by each taxpayer in 2011. Next, we calculate the IRPF paid by each taxpayer for his/her capital income in the same year, and add both taxes, obtaining the aggregate capital taxation for each taxpayer. We then calculate an aggregate average capital tax rate for each taxpayer, as the quotient between the aggregate capital taxation and the savings tax base of the taxpayer in 2011. Finally, we obtain the variable *DIFCAPITALTAXATION*, as the difference between the aggregate average capital tax rate for a taxpayer in 2011 if still resident in the same region as in 2006, and the aggregate average capital tax rate for that taxpayer in the remaining regions for the same year, 2011. Again, we expect a positive sign for the coefficient of this variable in our estimates. Figure 2 shows the distribution of changes in taxpayer residence, according to the difference between capital taxes borne in the region of origin and destination. As in Figure 1 for IRPF, here too the distribution of changes in residence is shifted to the right.

– *NONWAGE*: This variable is a proxy for differences in regional wealth taxes: IP and ISD. The variable indicates the percentage of each taxpayer's reported income coming from incomes other than wages in 2011 (i.e., capital, business, and professional income), and therefore it shows mainly the importance of the taxpayer's personal and business assets. If a greater weight of non-wage income favours the change of residence of top income taxpayers, it can be interpreted that these are responding to differentiated regional policies in wealth taxes. Consequently, we assign a positive sign for the coefficient of this variable.

To examine the relationship between the two variables representing the taxation of wealth and the age of taxpayers, we also incorporate two interacted

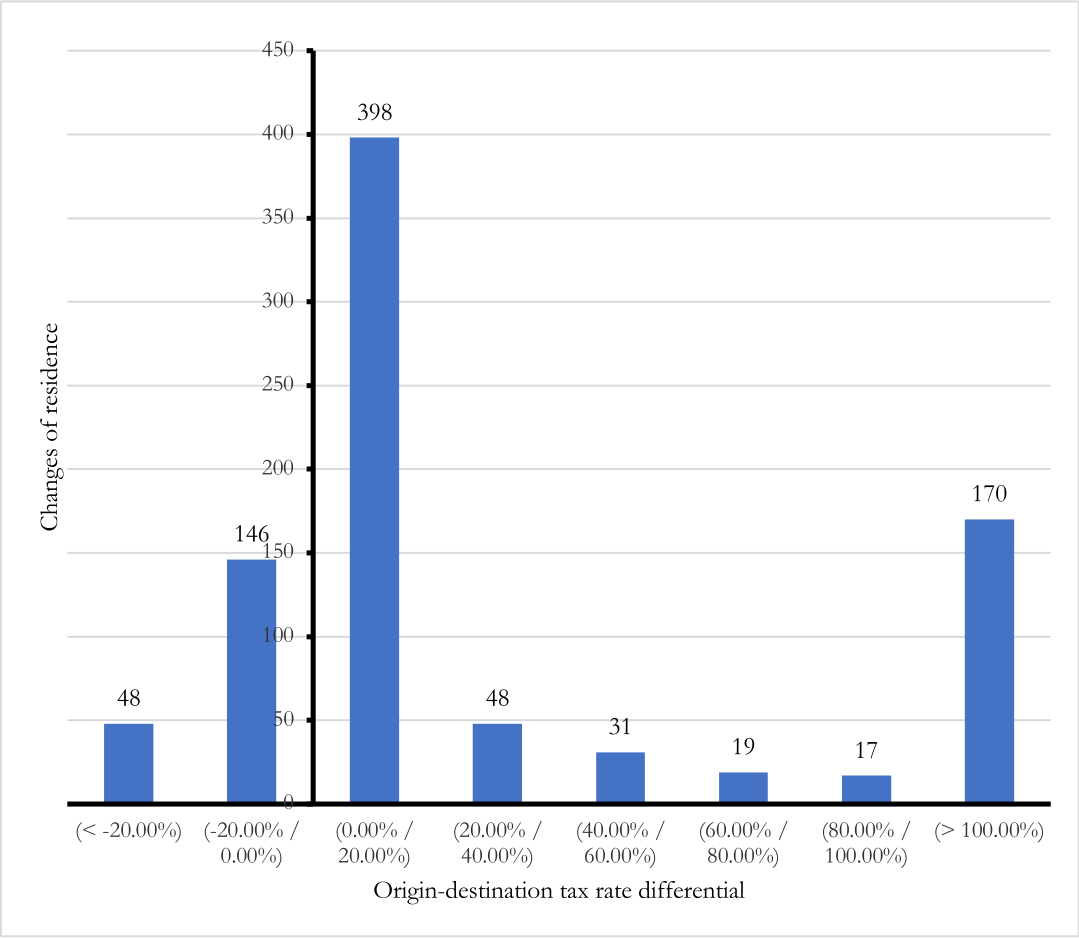

Figure 2: Distribution of changes of residence according to the difference in capital taxation average rates between the communities of origin (in 2006) and destination (in 2012).

variables into the estimates: *AGE*DIFCAPITALTAXATION* and *AGE*NONWAGE*.

3.2 Nontax Variables

3.2.1 Variables of Residential Attractiveness and Opportunities Enjoyed by Individuals

We include here a set of variables identified in the literature as factors influencing migration decisions in high-income cohorts. These are certain economic variables relating to residential attractiveness or the opportunities offered by some territories. Unless otherwise indicated, these variables were constructed based on different series available on the website of the Spanish National Statistics Institute (*Instituto Nacional de Estadística, INE*).

- *DIFGDPPC:* This variable measures the difference between the average per capita GDP in the other regions and in the region of origin, both in 2011. Lower per capita income in the region of residence in relation to the other ACs may be associated with lower earning opportunities and a reduced supply of public and private services, which will increase the probability of a change of residence. So, we expect a positive sign for the coefficient of this variable.
- *DIFHOUSINGPRICES:* This variable shows the difference in housing prices between regions. It is constructed by calculating, first, the variation in the housing price index (new and second-hand housing) from the first quarter of 2007 to the fourth quarter of 2011. Since this period coincides with the Great Recession, this variation

is a decrease in all ACs. Therefore, the difference is calculated between the average fall in prices in the other regions and in the region of origin, so that a smaller difference means a greater possible incentive for migration. Consequently, we expect a negative sign for the coefficient of this variable.

– *DIFMERITGOODS:* This variable represents regional differences in public spending relating to the welfare state (education, healthcare), and culture. With information on the functional classification of regional budgets, we calculated the percentage of nonfinancial spending allocated to on these three programmes. Next, we obtained the difference between the average value of these spending policies in the rest of the ACS and in the AC of origin, both in 2011. The expected sign is, a priori, ambiguous. On one hand, a greater weight of welfare expenditure in other regions may encourage a change of residence, in which case we would expect a positive sign for the coefficient of this variable. But, on the other hand, it does not seem that individuals in the top income percentiles of the income distribution are regular users of the public services of the welfare state, since they presumably meet these basic needs through a private provision. These individuals may be more interested in other budget items, such as infrastructure, spending on R&D, or other economic activities, so that the probability of changing residence will increase when this expenditure has a greater weight in the budget of other regions, and thus welfare expenditure has less weight. In this case, we would expect a negative sign for the coefficient of this variable.
– *DIFEMPLOYSERVICES:* This variable reflects regional differences in the weight of the services sector in each AC. Using the Active Population Survey (*Encuesta de Población Activa*, *EPA*) of the fourth quarter of 2011, we calculated the percentage of the population employed in the service sector, over the total number of employees. Next, we obtained the difference between the average value of this percentage in the rest of the ACs and in the AC of origin, both in 2011. The service sector includes some of the activities which most encourage mobility between territories and at lower costs, such as communications, specialised services for business or financial activities. A stronger service sector in other regions can stimulate the change of residence of the highest income taxpayers. We then expect a positive sign for the coefficient of this variable.
– *DIFEMPLOYFDI:* This variable shows regional differences in employment associated with foreign direct investment (FDI) in Spain. With data from *DataInvex* (statistics on foreign investment in Spain from the Ministry of Industry, Trade and Tourism), we calculate the percentage that represents this employment in each region on the national total. Next, we calculate the difference between the average value of this percentage in the rest of the ACs and in the region of origin, both in 2011. The greater weight of economic activity linked to FDI in the other ACs increases their attractiveness and opportunities, and therefore increases the probability of taxpayers changing their residence. We expect a positive sign for the coefficient of this variable.
– *DIFURBANISATION:* This variable shows regional differences in urbanisation rates, calculated as the percentage of the population in an AC living in an urban centre or high density cluster – more concretely, territories with a minimum density of 1,500 inhabitants per square kilometre, and a population of at least 50,000 (data from Goerlich and Cantarino, 2013). The variable is constructed calculating the difference between the average value of the urbanisation rate for the bordering ACs and the rate in the taxpayer's region of origin, both calculated in 2006, the latest year for which this information is available. We expect a positive sign for the coefficient of this variable: a higher urbanisation rate in neighbouring regions will increase the probability of a change of residence.[5]

3.2.2 Variables Related to Individual Characteristics

The information included in IRPF returns lets us add some sociodemographic variables to the specification, which relate a priori to possible migration to another region. These are

– *AGE, AGE*^{2}: A variable reflecting the taxpayer's age. To capture possible nonlinear effects on the endogenous variable, we introduced this variable accompanied by its squared value. The effect is expected to follow a U profile, with a negative sign for the coefficient of the variable *AGE* and positive for that of *AGE*^{2}. As commented, this would indicate the significant presence

5 When comparing the urbanisation rate of the taxpayer's region of origin with the rate in neighbouring regions, we recognise the importance of the distance between regions in migration decisions. However, we cannot introduce a specific distance variable in our specification, for two reasons. First, because as explained above, the dependent variable is the change of residence between 2006 and 2012, whatever the destination region. Second, because of the difficulty of measuring a relevant "distance" between regions, which depends less on the physical distance than on the existing transport and communications infrastructure between them.

of relatively elderly taxpayers looking for a favourable location for their retirement years, from the point of view of taxes too, if they are considering the transfer of their assets to their heirs.
- *DESCENDANTS*: This variable shows the number of descendants declared by the taxpayer, which is expected to act as a disincentive to changing residence. Consequently, we assign a negative sign for the coefficient of this variable.
- *SINGLE*: This variable reflects the taxpayer's marital status. It takes the value 1 for single taxpayers filing individual tax returns and 0 otherwise. For the opposite reasons to the previous variable, we expect a positive sign for the coefficient of this one.
- *SINGLEPARENT*: This variable reflects if the taxpayer does not live with the other parent of the children included in his/her IRPF tax return. It takes the value 1 for single parents filing joint tax returns and 0 otherwise. For the opposite reasons to the previous variable, we expect a negative sign for the coefficient of this one.

As stated above, our research is based on the information in the IRPF Panel. As our goal is to identify the possible migratory behaviour of top income taxpayers, we have selected individuals whose aggregate income places them in the top 1% in 2012, with the additional condition of having filed an IRPF return in 2006. This gives us a final subsample size of 21,890 taxpayers. Table A2 of Annex B presents the basic descriptive statistics of the distribution of the main tax magnitudes for the top 1%.

4 Estimates and Results

As a preliminary step, we analysed the correlation between the explanatory variables described above. For this purpose, we have calculated the variance inflation factor (VIF) of each of the variables described in Section 3 to confirm or discard possible multicollinearity problems. As a general rule, if a given variable presents a VIF higher than 10, there is evidence that the variable can be considered a linear combination of others which are also present in the estimate. In our case, this circumstance occurs only with the variable *DIFGDPPC*, so we did not consider it in the specifications presented below.[6] The descriptive statistics of the selected variables are shown in Table 6.

Meanwhile, given that the endogenous variable is binary, with values 0 and 1, we will perform logit or probit type estimates. In each case, we will choose the model with the most informative properties, looking for the one that presents a higher estimated value for the log-likelihood function.

First, we performed the estimate of the model (1) incorporating only the tax-related variables:

$$\begin{aligned} CHANGE_i = f(&DIFIRPF_i, AGE_i * DIFISD_i, \\ &DIFCAPITALTAXATION_i, AGE_i \\ &* DIFCAPITALTAXATION_i, NONWAGE_i, \\ &AGE_i * NONWAGE_i, \ \mu_i). \end{aligned} \tag{2}$$

The results of the estimate are contained in columns (1) and (2) of Table 7: the first shows the estimated values of the coefficients, and the second, its marginal effects when the coefficient is significant. The coefficients of all the tax-related variables were found to be significant. Consequently, we can state, first, that the probability of changing residence increases when the IRPF is more beneficial on average (i.e., it is lower) in the other ACs than in the taxpayer's region of origin. More specifically, according to the estimated marginal effect, if the difference between average tax rates increases by 10 percentage points in favour of the other regions, the probability of changing residence increases by 12.8 percentage points.

The probability of changing the region of residence also increases when the differences in the taxation of capital through IP and IRPF or the weight of nonwage incomes in the total income of the taxpayer increase, but this positive effect diminishes as the age of the taxpayer increases, so that for ages 75–76 years and above, it becomes negative. This result could be due to an increase in relocation costs with the age of the individuals.

With regard to regional differences in ISD, for a certain age, the probability of changing residence increases with the difference in taxes paid between regions. And also, for a certain difference in this tax between the region of origin and the other regions, the probability of migration increases with the age of the taxpayers.

Next, we add the variables of attractiveness, opportunity, and individual characteristics to the model, resulting in the following general specification:

6 The same problem appears for the variable *DIFEMPLOYFDI* in the estimate of the sample of taxpayers in the top 0.1%, excluding Madrid observations (see Table 7, column 9), so that this variable is also excluded from that particular estimate.

Table 6: Basic descriptive statistics of the endogenous and exogenous variables used in the specifications

Variable	Change	DIFIRPF (difference in p.p.)	DIFISD (difference in p.p.)	Dif Capital Taxation (difference in p.p.)	Non-wage (%)	Dif Housing Prices (difference in p.p.)	Dif Merit Goods (difference in p.p.)	Dif Employ Services (difference in p.p.)	Dif Employ FDI (difference in p.p.)	Dif Urbanisation (difference in p.p.)	Age	Descendants	Single	Single Parent
Mean	0.04	−0.0012	0.18	−543.38	0.36	0.0879	−0.0280	−0.0244	−0.1503	−0.2379	57.50	1.36	0.21	0.0157
Median	0	−0.0014	0	0.0009	0.15	0.1477	−0.0356	−0.004	−0.2214	−0.1807	56	1	0	0
Maximum value	1	0.0299	1	41757.88	1.10	0.1778	0.1529	0.1171	0.0623	0.2274	103	14	1	1
Minimum value	0	−0.0131	0	−2,262,153	−1.19	−0.1349	−0.1370	−0.1942	−0.2630	−0.5103	9	0	0	0
Standard deviation	0.19	0.0049	0.39	20037.91	0.40	0.0997	0.0356	0.0713	0.1256	0.2451	11.57	1.24	0.41	0.1244
Coefficient of skewness	4.85	1.51	1.63	−65.01	0.56	−0.76	−0.49	−0.13	0.52	0.17	0.46	1.12	1.40	7.79
Coefficient of kurtosis	24.57	8.35	3.67	5813.05	1.64	1.8876	4.86	1.34	1.41	1.65	3.07	6.08	2.96	61.62

$$CHANGE_i = f\begin{pmatrix} DIFIRPF_i,\ AGE_i * DIFISD_i, \\ DIFCAPITALTAXATION_i, \\ AGE_i * DIFCAPITALTAXATION_i\ , \\ NONWAGE_i,\ AGE_i * NONWAGE_i, \\ DIFHOUSINGPRICES_i,\ DIFMERITGOODS_i, \\ DIFEMPLOYSERVICES_i, \\ DIFEMPLOYFDI_i,\ DIFURBANISATION_i, \\ AGE_i, AGE_i^2, \\ DESCENDANTS_i, \\ SINGLE_i, SINGLEPARENT_i,\ \mu_i. \end{pmatrix} \quad (3)$$

The results of the estimates are shown in columns (3) and (4) of Table 7. The coefficients of the four tax variables are still significant, although their marginal effects are, in general, somewhat smaller than in the previous estimate. Now, if the difference between regional average IRPF rates increases by 10 p.p. in favour of the other regions, the probability of changing residence increases by 11.2 p.p. As for the control variables, the probability of changing residence increases when the other regions have a lower weight of merit goods in the budget, or a higher urbanisation rate. The probability of migration also decreases with age (until reaching a limit, when it starts to rise again) and is higher for the unmarried. To sum up, the estimate shows that the residence decisions of individuals belonging to the top 1% of income distribution seem to be conditioned, as well as by taxes, by factors relating to the attractiveness and the earning opportunities offered by the regions, and by certain characteristics of the individuals.

Although we do not know whether the change of declared residence of the richest taxpayers is due to an avoidance or evasion response – i.e., an artificial change of residence – or is a real response – i.e., an actual change of residence – the significance and sign of the coefficients of the control variables is compatible with an effective change of the primary residence.[7]

To complete this baseline estimate, we have run three additional exercises. In the first, we estimate the model specified in expression (3), but only for individuals in the 0.1% of the top income taxpayers. The results are

7 The State Tax Agency (*Agencia Estatal de Administración Tributaria, AEAT*) is setting up working groups with the tax administrations of some ACs to detect fictitious changes of residence for tax motives. No information is available on the results of this essential initiative.

Table 7: Results of the probit/logit[a] estimates for the different scenarios proposed

	Tax variables only		*Tax and non-tax variables*		*Taxpayers in the top 0.1%*		*Excluding taxpayers in Madrid*				*Taxpayers older than 64*			
							Taxpayers in the top 1%		*Taxpayers in the top 0.1%*		*Taxpayers in the top 1%*		*Taxpayers in the top 0.1%*	
	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$	Coeff.	$\partial P(Y=1)/\partial X_j$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DIFIRPF	44.72***	1.28	19,44***	1.12	19.18***	0.46	21.44***	0.73	-3.42		23.71***	1.37	4.07	
AGE*DIFISD	0.016***	0.0005	0.0023*	0.0001	0.004*	0.0001	0.002		0.02**	0.0003	0.006***	0.0004	0.003	
DIFCAPITALTAXATION	0.00048***	0.00001	0.00023***	0.00001	0.0005**	0.00001	0.0019		-0.07		-0.0002		0.0002	
AGE* DIFCAPITALTAXATION	-0.000006**	-0.0000002	-0.000003**	-0.0000002			-0.00004				0.000003			
NONWAGE	1.91***	0.05	0,11*	0.006	-1.43***	-0.03	0.20**	0.007	-4.21**	-0.05	0.27*	0.02	-5.35***	-0.39
AGE*NONWAGE	-0.025***	-0.0007			0.02***	0.0006			0.068**	0.0008			0.079***	0.006
DIFHOUSINGPRICES			-0.38		1.18		1.25		4.93		1.01		-0.39	
DIFMERITGOODS			-1.82**	-0.10	-4.26***	-0.10	-2.16		-13,50*	-0.17	-4.17***	-0.24	-4,13	
DIFEMPLOYSERVICES			-0.32		-0.53		1,77*	0.06	-4.16		-1.81		-1,79	
DIFEMPLOYFDI			0.41		2.07**	0.05	1.83**	0.06			0.1		-0.27	
DIFURBANISATION			0.90***	0.05	0.96**	0.02	-0.17		0.05		1.58***	0.09	1.69**	0.12
AGE			-0.07***	-0.004	-0.09***	-0.002	-0.05***	-0.002	-0.26***	-0.003	-0,02***	-0.001	-0.06**	-0.004
AGE²			0.0005***	0.00003	0.0006***	0.00001	0.0003**	0.00001	0.001**	0.00002				
DESCENDANTS			-0.008		0.07		-0.01		-0.15		0.07		0.25*	0.02
SINGLE			0.19***	0.01	0.32**	0.01	0.12		-0.24		0.29***	0.02	0.43**	0.04
SINGLE PARENT			-0.26		0.10		-0.13		1.01*	0.02				
CONSTANT	-3.64***		0.55		1.59		-0.36		5.84***		-0.61		1.96**	
No. observations[b]		20,283		20,283		3,993		13,597		2,178		5,859		1,231
LR χ^2		275.10		396.97		163.40		78.47		71.00		153.00		67.58
Prob > χ^2		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Log-likelihood function		-18,221.493		-17,371.075		-2,212.3087		-5,736.6882		-528.19245		-4,566.2554		-721.47819
Pseudo R^2 of prediction		0.0504		0.0947		0.1617		0.0496		0.1640		0.1289		0.1882

[a]The table shows, in successive columns, the value of the estimated coefficient in each of the suggested scenarios and the marginal effect of the significant variables over the probability that the different endogenous variables take the value 1.

[b]The number of observations in the Panel corresponding to the top 1% (or 0.1%, as applicable) of the richest taxpayers in the total population of IRPF taxpayers.

When estimates are made for taxpayers in the top 1% of reported income, the number of observations does not correspond to the total of the sub-sample used (20,283 taxpayers) due to the existence of individuals where relevant data are missing from the panel.

***Significant coefficient at 1%, **significant coefficient at 5%, *significant coefficient at 10%.

collected in columns (5) and (6) of Table 7, and show some differences from the previous estimate. The marginal effect of the coefficient of the difference in average IRPF tax rates is much less than for taxpayers in the top 1% of income. The variables related to the weight of non-wage income change their sign with respect to the initial estimate reflected in columns (1) and (3), suggesting that the profile of taxpayers in the top 0.1% differs from that of the top 1% as a whole. For the former, earning nonwage income discourages migration, although this disincentive reduces as age increases, becoming an incentive for ages 62 years and above. Our interpretation of this result is that, for these taxpayers, business income may be a substantial part of nonwage income. Business income is strongly linked to local factors, suppliers, and customers and is therefore subject to higher relocation costs than other more mobile assets, such as capital income (Sanandaji, 2014). As for the factors of opportunities and attractiveness of the regions, the estimate reflects that, as well as differences in the weight of merit goods and in the urbanisation rate, the probability of a change of residence for taxpayers in the top 0.1% is also affected, with the expected positive sign, by regional differences in employment associated with FDI.

In the second additional estimates, we adopted the strategy used by Young et al. (2016) to test for the importance of Florida in explaining the inter-state mobility of American millionaires. In order to test for the importance of the Community of Madrid as a destination of mobility from other regions (clearly reflected in Table 4), we again estimated the specification shown in (3), but excluding the taxpayers who were resident in Madrid in 2006 or 2012. It must be taken into account that, in addition to its economic attractiveness, since it hosts the capital of Spain, this AC is the one with the lowest personal taxes, as shown in Tables 1–3. The results are shown in columns (7) and (8) of Table 7, for taxpayers in the top 1%, and in columns (9) and (10), for those in the top 0.1%.

If we compare columns (7) and (8) with columns (3) and (4) of Table 7, we see that, for taxpayers in the top 1%, the coefficients of the variables showing the differences in the ISD and in aggregate capital taxation (IRPF + IP) are not significant when the sample excludes residents of Madrid. In other words, although differences in IRPF still increase the probability of mobility between the remainder ACs, mobility caused by regional differences in inheritance and capital taxation seems to flow mainly

towards Madrid. These results are consistent with the fact that Madrid has practically eliminated ISD for close relatives and does not tax its residents with the IP, while differences in IP rates among the other ACs are less important (Table 1). If we now compare columns (9) and (10) with columns (5) and (6) of Table 7, we can see that for top 0.1% taxpayers, the only tax variables whose coefficient is significant when taxpayers resident in Madrid are excluded are those reflecting the differences in ISD and in the weight of nonwage income. These results suggest that for the wealthiest taxpayers migrations caused by regional differences in IRPF and IP seem to flow mainly towards the Madrid region.

In our third additional estimates, we have estimated the model specified in expression (3) only for taxpayers aged 65 years or over, belonging to the top 1% and the top 0.1%. The results for the top 1% are given in columns (11) and (12) of Table 7 and show that the behaviour of older wealthy taxpayers is not very different to that of all taxpayers in the same income bracket, shown in columns (3) and (4). The coefficient of the variables representing the differences in capital taxation are not significant. On the other hand, the marginal effect of the coefficient of the variable of IRPF differences is larger than for the whole set of rich taxpayers: if the difference between average regional IRPF rates increases by 10 p.p. in favour of the other regions, the probability of older people changing residence increases by 13.7 p.p. The coefficient of the variable representing regional differences in the ISD is significant and with the expected positive sign. This result is in line with the literature reviewed in Section 1 for the United States.

However, the behaviour of older taxpayers included in the top 0.1% seems to be motivated only by the weight of non-wage income (in coherence with what happens for the whole group of taxpayers included in this income range), and the urbanisation rate (as well as sociodemographic variables), as shown in columns (13) and (14) of Table 7.

In conclusion, our estimates have confirmed the importance of regional differences in Spanish IRPF in the location choice of the richest taxpayers, first documented by Agrawal and Foremny (2019) but have also shown the significant effect that the IP and ISD have on these decisions. Our research has also highlighted the relevance of the Community of Madrid as the preferred destination region of the richest taxpayers. Finally, this study has found some particularities in the behaviour of taxpayers in the top 0.1%, which reinforces the importance of taking into account all incomes (wage, business, and capital) to properly identify the richest taxpayers.

5 Concluding Remarks

Although, by international standards, the mobility of individuals between Spanish regions is low (Caldera Sánchez and Andrews, 2011), the mobility of individuals in the upper income bracket is much higher, and seems to be influenced by tax factors. In this study, we have found empirical evidence that the decision of top income taxpayers to change residence is positively affected by lower taxes in other regions, as well as by some factors of attractiveness and opportunity offered by regions (in particular, higher rates of urbanisation and a lower weight of merit goods in the other regions) and certain personal characteristics (such as being young and single). However, the marginal effects are always very small, except for the coefficient of the variable showing differences in IRPF. It seems, therefore, that mobility among the richest in Spain is explained more by taking advantage of differences in taxes than by the "voting with their feet" modelled by Tiebout (1956).

The study also documents the importance of the Community of Madrid in the residence decisions of rich taxpayers. According to the results obtained, mobility due to differences in inheritance and capital taxation (and in capital taxation and IRPF for the top 0.1% taxpayers) seems to flow especially to the Madrid region.

Finally, the study finds evidence that the behaviour of older taxpayers in the top 1% does not seem very different from that of all taxpayers in the same income bracket. On to the contrary, the location decisions of the top 0.1% taxpayers do show some specificities in relation to the top 1% taxpayers as a whole.

Tax competition is a by-product, almost certainly inevitable, of a genuinely federal model of tax assignment among levels of government. But, as stated above, tax decisions made by uncoordinated governments can create a lot of externalities, affecting tax collection, efficiency, and income distribution. In Spain, these problems are mitigated in the IRPF, as ACs can exercise their powers only in the autonomic tax (as we saw in Section 2, initially 50% of overall IRPF), so that a minimum common taxation across the country is guaranteed with the national IRPF (the remaining 50%), and consequently, a minimum of national income redistribution is also guaranteed with that tax. However, the IP and ISD are totally decentralised to the ACs, so that their respective tax rates depend exclusively on regional legislation. Thus, to avoid tax competition leading to the elimination of these taxes (as it has happened in other federal countries), and if it is intended that IP and ISD continue to play a role in the national

redistribution of income and wealth, some limits should be introduced on regional powers in order to ensure a minimum common tax is applied throughout the country, as already suggested in the literature some time ago (López-Laborda, 2006). Judging by the results of this study, these measures could also contribute to reduce inefficient location decisions of some individuals, as well as the loss of tax revenues, especially necessary in a context of difficulties in sustaining public finances.

Funding information: This research was supported by the Government of Aragón (Project S23_20R, Grupo de Investigación de Economía Pública).

Author contributions: All authors (J.L. and F.R.) contributed to the conception and design of the study, the analysis of data and the writing of the paper.

Conflict of interest: Authors state no conflict of interest.

References

Agrawal, D. R., & Foremny, D. (2019). Relocation of the rich: Migration in response to top tax rate changes from Spanish reforms. *Review of Economics and Statistics*, *101*(2), 214–232.

Akcigit, U., Baslandze, S., & Stantcheva, S. (2016). Taxation and the international mobility of inventors. *American Economic Review*, *106*(10), 2930–2981.

Akcigit, U., Grigsby, J., Nicholas, T., & Stantcheva, S. (2022). Taxation and innovation in the twentieth century. *The Quarterly Journal of Economics*, *137*(1), 329–385.

Bakija, J., & Slemrod, J. (2004). Do the rich flee from high state taxes? Evidence from federal estate tax returns. *NBER working paper no. 10645*.

Boadway, R., & Shah, A. (2009). *Fiscal federalism. Principles and practice of multiorder governance*. New York: Cambridge University Press.

Brülhart, M., & Parchet, R. (2014). Alleged tax competition: The mysterious death of bequest taxes. *Journal of Public Economics*, *111*: 63–78.

Brülhart, M., Gruber, J., Krapf, M., & Schmidheiny, K. (2021). Behavioral responses to wealth taxes: Evidence from Switzerland. *American Economic Journal: Economic Policy*. forthcoming.

Caldera Sánchez, A., & Andrews, D. (2011). To move or not to move: What drives residential mobility rates in the OECD?. *OECD economics department working papers, 846*. Paris: OECD.

Coomes, P. A., & Hoyt, W. H. (2008). Income taxes and the destination of movers to multistate MSAs. *Journal of Urban Economics*, *63*(3), 920–937.

Day, K. M., & Winer, S. L. (2006). Policy-induced internal migration: An empirical investigation of the Canadian case. *International Tax and Public Finance*, *13*(5), 535–564.

Durán-Cabré, J. M., Esteller-Moré, A., & Salvadori, L. (2015). Empirical evidence on horizontal competition in tax enforcement. *International Tax and Public Finance*, *22*, 834–860.

Goerlich, F., & Cantarino, I. (2013). *Redefiniendo ciudades* (*Redefining cities*), *WP-EC 2013–06*. Valencia: IVIE.

Gordon, R. H. (1983). An optimal taxation approach to fiscal federalism. *Quarterly Journal of Economics*, *97*, 567–586.

Grossman, P. J. (1990). Fiscal competition among states in Australia: The demise of death duties. *Publius: The Journal of Federalism*, *20*(4), 145–159.

Kirchgässner, G., & Pommerehne, W. W. (1996). Tax harmonization and tax competition in the European Union: Lessons from Switzerland. *Journal of Public Economics*, *60*, 351–371.

Kleven, H. J., Landais, C., & Saez, E. (2013). Taxation and international migration of superstars: Evidence from the European football market. *American Economic Review*, *103*(5), 1892–1924.

Kleven, H. J., Landais, C., Saez, E., & Schultz, E. A. (2014). Migration and wage effects of taxing top earnings: Evidence from the foreigners' tax scheme in Denmark. *Quarterly Journal Of Economics*, *129*(1), 333–378.

Kleven, H. J., Landais, C., Muñoz, M., & Stantcheva, S. (2020). Taxation and migration: evidence and policy implications. *Journal of Economic Perspectives*, *34*(2), 119–142.

Leal, A., López-Laborda, J., & Rodrigo, F. (2009). Prices, taxes and automotive fuel cross-border shopping. *Energy Economics*, *31*(2), 225–234.

Leal, A., López-Laborda, J., & Rodrigo, F. (2014). The inside and outside revenue impact of regional gambling taxes in Spain. *Growth and Change*, *45*(1), 79–97.

Liebig, T., Puhani, P. A., & Sousa-Poza, A. (2007). Taxation and internal migration-evidence from the Swiss census using community-level variation in income tax rates. *Journal of Regional Science*, *47*(4), 807–836.

López-Laborda, J. (2006). Veinticinco años de financiación autonómica: balance y perspectivas (Twenty-five years of regional financing: Evaluation and perspectives), *Mediterráneo Económico*, *10*, 197–219.

López-Laborda, J., & Monasterio, C. (2007). Regional governments: vertical imbalances and revenues assignments. In J. Martinez-Vazquez & J. F. Sanz-Sanz (Eds.), *Fiscal reform in Spain. Accomplishments and challenges* (pp. 422–452). Cheltenham: Edward Elgar.

Ministry of Public Finance and Public Administration. (2006–2019). *Ebook tributación autonómica* (E-book autonomic taxes). http://www.minhafp.gob.es/es-es/areas%20tematicas/financiacion%20autonomica/paginas/libro%20electronico%20tributacion.aspx.

Moretti, E., & Wilson, D. (2017). The effect of state taxes on the geographical location of top earners: Evidence from star scientists. *American Economic Review*, *107*(7), 1858–1903.

Moretti, E., & Wilson, D. (2019). Taxing billionaires: Estate taxes and the geographical location of the ultra-wealthy. *NBER working paper no. 26387*.

Sanandaji, T. (2014). The international mobility of billionaires. *Small Business Economics*, *42*, 329–338.

Schmidheiny, K., & Slotwinski, M. (2018). Tax-induced mobility: Evidence from a foreigners' tax scheme in Switzerland. *Journal of Public Economics*, *167*, 293–324.

Tiebout, Ch. M. (1956). A pure theory of local expenditures. *Journal of Political Economy*, *64*, 416–424.

Young, C., Varner, C., Lurie, I. Z., & Prisinzano, R. (2016), Millionaire migration and Taxation of the elite. Evidence from administrative data. *American Sociological Review*, *81*(3), 421–446.
Zabalza, A., & López-Laborda, A. (2011). The new Spanish system of intergovernmental transfers. *International Tax and Public Finance*, *18*, 750–786.
Zabalza, A., & López-Laborda, J. (2017). The uneasy coexistence of the Spanish foral and common regional finance systems. *Investigaciones Regionales – Journal of Regional Research*, *37*, 119–152.

Annex A

As explained in the main text of the study, we used a subsample of 96,639 taxpayers corresponding to the tax year 2007, included in the IRPF Panel and also filing that year IP return. Based on the information on these taxpayers' IRPF and IP returns, our objective was to estimate their reported wealth, via the variables which could also be found in the IRPF return, in order to use the estimated values of the coefficients to impute to each taxpayer in the IRPF Panel the amount of his/her wealth in 2011.

Unfortunately, the subsample offered hardly any information to complement that included in the IP return. For example, there was no information on the composition of the taxpayer's household, their age, gender, city of residence, etc. The only additional information was on the region of residence of the taxpayer or the financial regime of married couples.

Several plausible specifications were available, but we finally chose the following:

$$WEALTH_i = f(TBIRPF_i,\ TBIRPF_i^2,\ CGlt_i,\ CGlt_i^2,\ MAD/CAT_i,\ \mu_i) \quad \text{(A1)}$$

where

– *WEALTH* represents the tax base of the IP declared by the taxpayer.

– *TBIRPF* represents the total taxable base of the IRPF, without taking into account the taxpayer's possible long-term capital gains.

– *CGlt* represents the positive balance of the difference between long-term capital gains and losses, due to transmissions of assets acquired more than a year before the date of transmission.

The two income variables are also squared in order to capture predictable nonlinear effects.

– *MAD/CAT*: A dummy presenting value 1 if the taxpayer is resident in Madrid or Catalonia, and value 0 otherwise. Taking into account that taxpayers resident in these regions constitute 41.5% of the subsample and that they also report substantially greater average IP tax bases, with this binary variable we want to capture a possible differential effect of residence in these ACs.

Table A1 shows the results of the estimate of equation (A1) by ordinary least squares.

Table A1: Results of the OLS estimate of individual wealth through the information in the wealth tax returns

Dependent variable: ***WEALTH***		
	Coefficient	**Standard error**
TBIRPF	1.55***	0.02
$TBIRPF^2$	-7.66×10^{-10}***	1.19×10^{-11}
CGlt	1.96***	0.02
$CGlt^2$	-7.58×10^{-9}***	1.89×10^{-10}
MAD/CAT	297974.1***	20009.67
Constant	693579.2***	13043.38

N = 96,639 observations.
F (5.96633) = 4447.73/Prob > F = 0.0000.
R^2 = 0.1871/R^2 adjusted = 0.1870.
*** Significant coefficient at 1%.

Annex B

Table A2: Basic descriptive statistics of the tax magnitudes for the top percentile, 2012 (in €)

A) Total autonomous communities

Variable	Aggregate tax base (top 1%)	Aggregate tax base (top 0.1%)	Aggregate tax base (age >64 years)	Aggregate tax base (not including Madrid)
Mean	224,281	801,779	249,863	206,892
Median	151,464	548,577	157,296	146,629
Maximum value	31,600,000	31,600,000	31,600,000	30,200,000
Minimum value	108,465	339,358	108,482	108,465
Standard deviation	403,838	1,110,220	538,759	324,250
Coefficient of skewness	29.58	12.50	27.75	32.30
Coefficient of kurtosis	1,537	240.65	1,185	1,971

B) By autonomous community

Aggregate tax base	Andalusia	Aragon	Asturias	Balearic Islands	Canary Islands	Cantabria	Castile-La Mancha	Castile and Leon	Catalonia	Extremadura	Galicia	Madrid	Murcia	La Rioja	Valencian Community	Ceuta	Melilla
Mean	196,011	173,691	192,791	213,262	210,198	181,424	193,323	192,112	215,872	170,165	208,621	251,056	178,428	195,011	217,763	221,472	199,669
Median	142,075	131,141	151,779	159,489	163,181	142,636	144,189	145,367	146,397	131,553	140,511	158,793	144,834	166,895	149,944	156,398	143,456
Maximum value	6,241,279	1,758,396	1,680,758	5,103,857	3,250,527	4,526,701	2,834,785	4,876,873	30,200,000	973,234	9,010,599	31,600,000	1,329,798	1,105,654	21,000,000	2,467,355	1,208,859
Minimum value	108,525	108,465	198,482	108,752	108,629	108,590	108,649	108,517	108,488	108,637	108,563	108,477	108,570	108,956	108,542	111,009	118,402
Standard deviation	213,364	126,039	159,749	221,897	169,800	190,764	161,087	179,118	370,199	103,699	241,792	502,550	104,802	118,125	488,403	257,526	146,906
Coeff. of skewness	13.15	5.56	4.66	10.93	6.10	16.14	5.14	9.26	28.92	3.46	14.78	25.75	4.73	3.54	28.64	6.86	4.26
Coeff. of kurtosis	311	47	30	196	74	351	52	161	1,711	18	452	1,108	39	21	1,073	59	27

C) By items in the IRPF return

Variable	Income from wages and salaries	Movable capital income	Real estate income	Income from self-employed and business owners (direct assessment scheme)	Income from self-employed and business owners (simplified direct assessment scheme)	Income from self-employed and business owners (objective assessment scheme)	General taxable base	Savings taxable base	Tax liability
Mean	127,821	26,209	5,389	23,059	45	227	161,537	62,744	82,200
Median	112,324	3,689	0	0	0	0	124,205	7,626	52,604
Maximum value	12.400.000	20,900,000	861,938	11,100,000	108,828	198,248	12,300,000	31,500,000	8,518,542
Minimum value	−13,379	−3,059,321	−199,581	−380,939	−97,299	−75,884	−169,491	0	0
Standard deviation	212,385	189,030	20,312	110,439	1,607	3,035	231,997	327,278	150,869
Coefficient of skewness	18.77	52.93	9.77	28.92	−0.60	19.15	18.47	45.14	21.16
Coefficient of kurtosis	709	4,718	175	2,129	1,581	605	671	3,181	763