

**International Center for Public Policy  
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# **Do You Know to Whom You Pay Your Taxes?: The Case of Decentralized Spain**

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## **Abstract**

A necessary condition for the efficiency gains that the theory of fiscal federalism attributes to decentralization to be effective is that citizens rightly assign the governmental responsibility for public action. However, surveys show that most Spaniards are unable to correctly identify the taxes received by the various levels of government. Exploiting the 2015 wave of the Spanish Institute for Fiscal Studies' Fiscal Barometer, this paper empirically determines the profile of citizens who are best able to identify the allocation of taxes among levels of government in Spain. The estimates suggest that these citizens are those who are able to identify the government that provides the services financed by those taxes, who correctly identify other taxes received by the same government, who reside in a chartered ("foral") region, and who enjoy a high level of education.

**Keywords:** Visibility, Tax Revenues, Information, Decentralization, Fiscal Barometer, Spain  
**JEL Codes:** H71, H77

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## **1. Introduction**

Over the last four decades, Spain has undergone a major process of decentralization of expenditure and (with some delay) taxation responsibilities. Although the devolution process was notably directed to the construction of the regional level of government, local entities also experienced an increase in their taxation and expenditure powers.

At present, Spanish regions (Autonomous Communities: hereinafter, ACs) currently participate in the yield of most of the taxes of the Spanish tax system, through the figure of the so-called "ceded taxes," and they can also exercise some powers in the regulation and management of these taxes. Municipalities are also assigned a set of taxes whose powers of collection and management correspond to local entities; municipalities can also modulate their tax rates.

Fiscal federalism justifies the decentralization of revenues and expenditures mainly by the potential efficiency gains it brings for the provision of regional and local public goods and services. On the one hand, subcentral governments can know and meet individual preferences for regional and local public goods and services better than central governments, which favours consumer efficiency (Oates, 1972). On the other hand, decentralization introduces competitive pressures into public activity; those pressures favour the preservation of markets, the experimentation and innovation of governments, the decrease of corruption, and the reduction of the influence of interest groups. As a consequence, under certain informational and institutional conditions, decentralization also promotes efficiency of delivery by governments of subcentral goods and services, that is, productive efficiency (Keefer & Khemani, 2005; Oates, 2005; Lockwood, 2009; Weingast, 2009; Joanis, 2013, 2014).

But for these efficiency gains to be effective, citizens in each jurisdiction need to be able

to compare the costs and benefits of the goods and services provided to them by the different levels of government. This requires, among other conditions, first, that there be a clear assignment of responsibilities between government levels, in the laws and, very especially, in their implementation (Key, 1966; Rodden et al., 2003). In addition, citizens must be able to correctly attribute responsibilities to each level of government, that is, they must identify the taxes they pay to each level of government and the services provided by each government in return. Without a proper perception of the costs and benefits of public action by each jurisdiction, accountable behaviour cannot be expected, either in the demands of individuals for public services from their respective governments or in the delivery of such services.

In Spain, as in other decentralized countries, the aforementioned conditions for an efficient delivery of public goods and services are not satisfactorily met. On the one hand, the legal distribution of expenditure and (particularly of) taxation powers among levels of government is, as we shall see, rather complex. On the other hand – and probably due, at least in part, to this complex delimitation of powers – citizens are not able to clearly identify which level of government provides them with some of the services they receive or to which level of government they pay the taxes by which those services are financed. Hence the interest in identifying the factors that explain the greater or lesser ability of citizens to correctly attribute responsibility for various public expenditures and tax revenues. Only then can policy recommendations be rationally raised in order to improve this (in)visibility problem.

While the literature has dealt extensively with the determinants of the visibility of spending powers across many different decentralized settings (including Spain), empirical research on the tax side is almost non-existent. In the Spanish case, other than from a descriptive point of view (León, coord., 2015; Herrero Alcalde et al., 2015), the only paper which tried to

econometrically estimate Spaniards' visibility in the allocation of the Personal Income Tax and the Value Added Tax between central and regional levels is López-Laborda and Rodrigo (2014).

In the present paper, we extend the research on tax visibility in several directions. First, our aim remains to empirically identify the factors that favor or hinder Spanish citizens' accurate attribution of the taxes they pay to finance each level of government. In contrast to López-Laborda and Rodrigo (2014), however, we consider the three levels of government in the country: central, regional and local. Second, we conduct an econometric analysis for seven of the main taxes that make up the Spanish tax system: Corporate Income Tax (IS), Personal Income Tax (IRPF), Value Added Tax (IVA), Inheritance and Gift Tax (ISD), Capital Transfer Tax, Taxes on the Raising of Capital, and Stamp Duties (ITPAJD), Property Tax (IBI) and Vehicles Tax (IVTM). Third, these exercises are carried out for the year 2015, the last year in which the Fiscal Barometer collected information on these issues. As we explain in detail in Section 4, this questionnaire is the most recent survey on tax visibility in Spain and much more suitable than that used in López-Laborda and Rodrigo (2014) to obtain reliable results on the visibility of the allocation of tax revenues between levels of government.

Spain is a particularly interesting case for studying the influence of institutional aspects on tax visibility. Firstly, the process of fiscal decentralization has been carried out asymmetrically, so that only since 2002 have all ACs been able to perform the same competences. There is also another asymmetry in tax assignment, since the ACs of Navarre and the Basque Country enjoy a so-called *foral* regime that allows them to exert broader powers over the collection, management and regulation of their taxes. In the remaining ACs, the allocation of taxes presents a very varied picture. On the one hand, the yield of some taxes is assigned exclusively to one level of government (central, regional or local), while all three levels share in

the revenues of the major taxes (IRPF, IVA, and excise duties). On the other hand, the powers that each government can exercise over collection, management and regulation also differ between taxes. Out of all these singularities, we will see that the one that seems to influence tax visibility the most is foral asymmetry.

In order to empirically analyze the issue of tax visibility in Spain, we use the answers given by 3,000 citizens to the questions of the Fiscal Barometer 2015, published by the Institute for Fiscal Studies (Ministry of Finance). In our models, the dependent variables will always be discrete (the citizen may or may not be able to identify the level of government responsible for a given tax), so we estimate probit/logit-type models, at the same time accounting for the possible multilevel (regional) structure of the data. The independent variables are grouped in line with the literature in various explanatory hypotheses of the visibility of tax assignment between levels of government. According to the results obtained, there are a few elements that characterize citizens who best perceive the allocation of taxes in Spain: being informed of the allocation of functions between levels of government, being aware of other taxes levied by the same level of government, residing in a foral region and enjoying a high level of education. These features allow us to provide a series of recommendations to improve visibility in the assignment of taxes between levels of government in Spain.

The shortcomings in the identification of the allocation of taxes (and expenditures) among levels of government are part of a broader problem, such as the lack of fiscal culture of citizens, in this case, Spaniards, and the consequences thereof. Other manifestations of this lack of tax culture are, for instance, citizens' lack of knowledge of how much tax they pay and their attitudes towards tax evasion, as surveys from different sources persistently show (Centro de Investigaciones Sociológicas, 2020; Navas, coord., 2020). Although these aspects are not dealt

with directly in this paper, they could have some influence on tax assignment visibility, as we will see below.

The paper is organized as follows. After this introduction, the second Section provides the conceptual framework and literature review. The third Section describes the Spanish institutional background, summing up the distribution of expenditure and tax responsibilities among levels of government. The fourth Section describes the database. The fifth and sixth Sections present, successively, the specifications and estimates performed. The last Section concludes and discusses the main policy implications arising from the results obtained.

## **2. Conceptual Framework and Literature Review**

There are two main strands of research dealing with the visibility of the distribution of responsibilities and policy outcomes in decentralized countries. The first (and most prolific) strand is related to the topic of economic voting and studies how voters' attribution of responsibilities to different levels of government affects the direction of their vote (Tibbitts, 1931; Key, 1966; Powell & Whitten, 1993; Rudolph, 2003a, 2003b; Cutler, 2004, 2008; Anderson, 2006; Arceneaux & Stein, 2006; Marsh & Tilley, 2010; Tilley & Hobolt, 2011; de Vries & Giger, 2014; Anderson et al., 2017; on the Spanish case, see Jaime Castillo & Sáez Lozano, 2007; Lago Peñas & Lago Peñas, 2011; Fraile & Lewis-Beck, 2013; León & Orriols, 2016; León & Jurado, 2019). With respect to this line of research, it is worth noting that tax visibility has been only recently (and seldom) used as an explanatory variable of (and generally found negatively related to) electoral support (Johns, 2011; Anderson et al., 2017; Cutler, 2017).

A second strand of research, in which this paper is included, aims to identify the determinants of visibility, i.e., which factors influence citizens' ability to correctly attribute responsibilities across levels of government. The literature has dealt extensively with the

determinants of allocation visibility for economic and expenditure-based responsibilities (namely education, health, unemployment insurance and social services) among government levels, but research on the tax side is almost non-existent.

On the conceptual side, the starting point on visibility stems from the fact that citizens form their preferences and beliefs according to the information they are exposed to (Malhotra, 2008), including willingness not to know (Ginzburg & Guerra, 2019). In this vein, and precisely emphasizing the role of information, the literature has identified individual and institutional/contextual features as the two dimensions shaping government visibility in citizens (Rudolph, 2003b; Hobolt & Tilly, 2014; Cordero & Lago Peñas, 2016; Herrero Alcalde et al., 2018).

At the individual-level, citizens' knowledge about the distribution of responsibilities depends on socio-demographic characteristics, as well as on political values and beliefs. With respect to the former, age is positively associated with obtaining information on what level of government carries out each policy, although the sign may change for older ages (Lau & Redlawsk, 2009; León, 2010, 2011; Lago Peñas & Lago Peñas, 2013; López-Laborda & Rodrigo, 2015; Herrero Alcalde et al., 2018). The same applies for more educated people, as education has been proved as a proxy for greater political sophistication (Luskin, 1990; León & Ferrín, 2007; Cutler, 2008; León, 2010, 2011, 2012; López-Laborda & Rodrigo, 2015; Herrero Alcalde et al., 2018). With regard to sex, although there is some evidence about greater political knowledge of men with respect to women (Fraile, 2014; Herrero Alcalde et al., 2018), greater or lesser awareness depends also on other circumstances, such as habitat size (López-Laborda & Rodrigo, 2012). Work status is also positively correlated with visibility, given that it comprises one of the most important sources of individuals' information (Downs, 1957). Thus, being an

employee (Rudolph, 2003a; León & Ferrín, 2007; León, 2010) or working for the public sector (López-Laborda & Rodrigo, 2015) favours the accurate identification of responsibilities. Finally, if citizens consume certain public goods and services and are therefore more related to public sector activity, they are also more likely to better identify the correct level of government responsible for the provision of those goods or services (López Laborda & Rodrigo, 2014; León, coord., 2015, Herrero Alcalde et al., 2018).

With regard to political values and beliefs, literature has provided evidence about the pervasive effect on visibility stemming from group-serving biases, such as partisan (and voting) loyalties and identity-related issues: Rudolph (2003a and 2003b), Maestas et al. (2008), Malhotra (2008), Malhotra and Kuo (2008) and Brown (2010) for USA; Marsh and Tilley (2010), Tilley and Hobolt (2011), Hobolt et al. (2014) and León and Orriols (2019) for UK and Ireland; and Wilson and Hobolt (2015) and León et al. (2018) for the European Union. In the Spanish context, right-wing ideology hinders the correct attribution of responsibilities (León & Ferrín, 2007; León, 2011, 2012; López-Laborda & Rodrigo, 2015), as well as the preference for a centralized state (León, 2010, 2011, 2012; Lago Peñas & Lago Peñas 2013; López-Laborda & Rodrigo, 2015).

In addition, political sophistication seems to favour the accurate attribution of responsibilities. As defined by Gomez and Wilson (2008: 639), political sophistication “packs together related, if distinguishable, properties including a tendency to pay close attention to politics, to have ready at hand banks of information about it, to understand multiple arguments for and against particular issue positions, and to recognize interrelationships among those arguments” (see also De Vries & Giger, 2014).

Literature confirming the political sophistication argument in Spain is extensive: see, for

example, León and Ferrín (2007), León (2010, 2011), Lago Peñas and Lago Peñas (2013), López-Laborda and Rodrigo (2014), and Cordero and Lago Peñas (2016). People with favorable views about the public sector or certain policies also tend to have a greater degree of visibility (León & Ferrín, 2007; López-Laborda & Rodrigo, 2014).

As far as institutional/contextual factors are concerned, and drawing on the Canadian experience, Cutler (2013, 2017) strongly warns that the conditions for a proper identification of the governments responsible for each policy can only be expected “under a ‘watertight compartments’ version of federalism where only one government is involved in a given policy area” (Cutler, 2017: 1055), but not “in a context with highly evolved multi-level government structures—that is, complex intergovernmental relationships that vary across policy domains” (Cutler 2013: 26; León et al., 2018, regarding EU countries). It should be added that there are also important institutional differences between advanced federations that may affect the attribution of responsibilities by citizens (León & Orriols, 2016).

Spain provides a good example of these caveats. In principle, clarity in the distribution of competences may facilitate their visibility – for example, if the competences are exclusive to a single level of government (Lago Peñas & Lago Peñas, 2013) or citizens reside in a foral region (López-Laborda & Rodrigo, 2015; León, coord., 2015; León & Orriols, 2016; Herrero Alcalde et al., 2018). But this greater visibility may be contingent (with an uncertain sign) on other factors, such as residence in ACs that first achieved a higher level of competences (Lago Peñas & Lago Peñas, 2010, 2013; León, 2011) or the ideological coincidence between the national and regional governments (León 2011; León & Orriols, 2016; Herrero Alcalde et al., 2018). The existence of coalitions in government can also hamper citizens' visibility (Lago Peñas & Lago Peñas, 2010). Finally, although Cutler (2008), for Canada, finds that judgments about responsibility are

unstable over time, in Spain, there is agreement that visibility improves over time (León, coord., 2015; Cordero & Lago Peñas, 2016; León 2010, 2012), although only for regions that first achieved a higher level of responsibilities.

As Herrero Alcalde et al. (2018) highlight, media are a contextual factor of crucial importance in the process that allows citizens to obtain the information they need to identify the government responsible for each policy. The positive impact of mass media on visibility has been widely contrasted in the literature (Cutler, 2008; Ben-Porath & Shaker, 2010; López-Laborda & Rodrigo, 2015; Wilson & Hobolt, 2015). The same effect should be expected for people living in urban areas, since it is observed worldwide that there is a concentration of human capital in cities (Goerlich Gisbert & Reig Martínez, dirs., 2020), a conjecture that has gained empirical support (Herrero Alcalde et al., 2018).

The only paper that, as far as we know, econometrically explores tax revenue visibility pointed out that, for the Spanish case and for a pool of the years 2005, 2007 and 2010, visibility is higher for those who correctly attribute expenditure-based powers, are more educated, and live either in large cities, in foral regions or in regions which first achieved a higher degree of devolution, while non-taxpayers and citizens living in self-financing regions show less government visibility (López-Laborda & Rodrigo, 2014). Thus, according to the above taxonomy of factors shaping services visibility, in the Spanish case, individual as well as institutional/contextual-level determinants also seem to influence citizens' tax revenues visibility. Among the institutional factors, some directly related to the design of the tax assignment system implemented in Spain are significant.

As we have pointed out above, this last paper has some limitations, derived from the number of taxes analyzed (only IRPF and IVA), the levels of government considered (only

central and regional) and, importantly, the way some key questions on tax visibility were asked in the survey that was the basis of the database used. In the present paper, we try to overcome these limitations while enriching the explanatory hypotheses of the visibility of the allocation of tax revenues between levels of government.

### **3. Institutional Background: The Devolution Process in Spain<sup>1</sup>**

Soon after democratic restoration in 1977, Spain went through a devolution process that has led the country to be nowadays one of the most decentralized states worldwide (OECD, 2020). In addition to the central government, the territorial organization of the country includes 17 autonomous communities and 2 autonomous cities (the North African cities of Ceuta and Melilla) at the autonomic/regional level, and 50 provinces and more than 8,100 municipalities at the local level.

The constitutional assignment of functions between levels of government broadly follows the conventional principles of fiscal federalism. The central level has responsibilities in areas that affect the functions of stabilization, redistribution and provision of national public goods, such as economic planning, pensions, unemployment benefits, international relations, defense, regulation of the financial system, national infrastructure and transportation and so on.

At the regional level, devolution took place asymmetrically. In terms of responsibilities for providing goods and services, almost half the ACs experienced a high level of devolution from the very beginning,<sup>2</sup> while the remaining ones caught up just in the early twenty-first century. Today, notwithstanding some singularities, all regions are responsible for providing a wide range of public services with a regional scope, such as health and education, social services,

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<sup>1</sup> For an in-depth analysis of the decentralization process in Spain, see Monasterio and Suárez Pandiello (1998), Aja (1999), and López-Laborda et al. (2020).

<sup>2</sup> Those regions were the Basque Country, Catalonia, Galicia, Navarre, Canary Islands, Andalusia and Valencia.

agriculture, industry, environment and regional infrastructures. In turn, local governments are assigned the responsibility for local public goods and services.

The constitutional architecture allocates revenues among levels of government in an even more complex way than the assignment of expenditure responsibilities. At the regional level, two groups of ACs must be distinguished: ACs under the foral or charter regime, which are the Basque Country and Navarre, and ACs under the common regime, all others. As a whole, the ACs under the common regime obtain their revenues from two basic sources: the so-called "ceded taxes" (*impuestos cedidos*) and the grants from the central level (which, to some extent, have an equalization purpose). At present, ceded taxes (and other minor own revenues, like fees, charges and so on) amount to 80% of non-financial revenues for all the ACs under the common regime; grants represent the remaining 20%.

Ceded taxes are established and regulated by the central level, though the proceeds are assigned in whole or in part to the ACs. Until 1997, the ACs did not have any powers to regulate the structure of ceded taxes, although in some cases they did have powers to manage them. Since 1997, the ACs were granted various degrees of discretion with regard to some of the ceded taxes, which allowed them to set the tax rate and establish tax credits and allowances. Table 1 details all taxes currently ceded to the ACs under the common system, as well as the powers that common-system ACs may exercise over them. There are only two relevant taxes that have not been ceded to the ACs: the IS and social security contributions, over which the central government continues to exert all powers.

**Table 1. Taxes Assigned to Autonomous Communities**

Tax	Sharing Of Collection [Initial % Of Assignment]		Administration by Regional Governments		Discretion by Regional Governments	
	Common Regime	Foral Regime	Common Regime	Foral Regime	Common Regime	Foral Regime
Personal Income Tax	[50%]	100%	No	Yes	Tax schedule and tax credits	Full
Wealth Tax	100%	100%	Yes	Yes	Threshold, tax schedule and tax credits	Full
Inheritance and Gift Tax	100%	100%	Yes	Yes	Allowances, tax schedule, tax credits,	Full
Corporate Income Tax	-	100%	-	Yes	-	Full
Non-Resident Income Tax	-	100%	-	Yes	-	Full for permanent establishments
Capital Transfer Tax, Taxes on The Raising of Capital, and Stamp Duties	100%	100%	Yes	Yes	Tax rates and tax credits (with some exceptions), administration	Full (with some exceptions)
Gaming taxes	100%	100%	Yes	Yes	Allowances, taxable base, tax rates, administration	Full (with some exceptions)
Vehicle excise (registration)	100%	100%	Yes	Yes	Tax rates (subject to limitations)	Tax rates (subject to limitations), declaration and payment forms and payment periods
Value-Added Tax	[50%]	100%	No	Yes	No	Only on declaration and payment forms and payment periods
Excise duties: alcoholic beverages, tobacco, and hydrocarbons	[58%] (100% of the special rate of the Tax on Hydrocarbons)	100%	No	Yes	No	Only on declaration and payment forms and payment periods
Electricity Tax	100%	100%	No	Yes	No	Only on declaration and payment forms and payment periods
Tax on Insurance Premiums	-	100%	-	Yes	-	Only on declaration and payment forms and payment periods
Tax on Gaming Activities (*)	100% electronic, computer or telematic games 100% revenue from increase in tax rate	100%	No	Yes	Tax rates (subject to limitations), when the organizers reside in the Community, applicable only to players residing in this Community	Tax rates (subject to limitations), when the organizers reside in the foral territory, applicable only to players residing in the foral territory/AC. Declaration and payment forms and payment periods
Environmental taxes: electricity, nuclear fuel, gas, oil and condensate, fluorinated gases	-	100%	-	Yes	-	Only on declaration and payment forms and payment periods
Tax on Deposits with Credit Institutions (*)	100%	100%	-	Yes	No	Only on declaration and payment forms and payment periods
Special Tax on Coal	-	100%	-	Yes	-	Only on declaration and payment forms and payment periods

(\*) Although the Communities under the common regime have a share in this tax, it does not (yet) have the legal status of ceded tax.

Source: Authors' elaboration.

Table 1 shows that the four regional taxes considered in our research have a very different regimes of decentralization. In IRPF and IVA, the ACs have a share of 50% of the collection but their management is the responsibility of the central government. ACs have discretion over the tax rate and some tax credits in the IRPF, but they cannot legislate on IVA. In the ITPAJD and

the ISD, the ACs are entitled to 100% of the collection, manage both taxes and have wide discretion over the tax rate, allowances and tax credits.

The foral communities obtain almost 100% of their revenues from the so-called "agreed taxes" (*tributos convenidos* in Navarre and *tributos concertados* in the Basque Country). As shown in Table 1, foral ACs enjoy more powers over these taxes than the common regime ACs over the corresponding ceded taxes. The only tax that remains outside of the foral regime are social security contributions. In all the taxes that constitute the object of our investigation, including the IS, charter regions receive 100% of the collection, in addition to managing and regulating them (with the exception of IVA). It is also worth noting that in the Basque Country tax powers do not correspond to the Autonomous Community but to the three provinces or "historical territories" that make it up, so that the Autonomous Community is financed by means of grants from the provincial governments. This differential feature determines some of the options followed subsequently in the definition of the variables used in our empirical application. This is not the case of Navarre, because there the provincial and regional levels perfectly overlap. The foral communities contribute to financing the expenditure responsibilities of the central level through a grant, which is called quota (*cupo*) in the Basque Country and a contribution (*aportación*) in Navarre.

As in the case of the ACs under the common regime, the revenue of all Spanish municipalities also comes from taxes and grants. Currently, the former represents almost 65% of the non-financial revenue of all municipalities; transfers form the other 35%. Table 2 summarizes the powers that municipalities can exercise on each tax. In the two taxes that we deal with in our application (IBI and IVTM), municipalities receive the entire collection, manage the taxes and can set the tax rates and some allowances and tax credits. Table 2 further shows that large cities

take a small share in the collection of the major taxes, such as IRPF, IVA, and Excise Duties.

**Table 2. Taxes Assigned to Municipalities**

<b>Tax</b>	<b>Sharing of Collection</b>	<b>Admin. by Municipalities</b>	<b>Discretion by Municipalities</b>
Property Tax	100%	Yes	Tax rates, allowances and tax credits
Local Business Tax (*)	100%	Yes	Tax rates and tax credits
Vehicles Tax	100%	Yes	Tax rates and tax credits
Tax on Land Value Increases (**)	100%	Yes	Tax rates, allowances and tax credits
Tax on Constructions, Facilities and Infrastructure (**)	100%	Yes	Tax rates and tax credits
Tax on Luxury Expenditures (hunting and fishing grounds) (**)	100%	Yes	Full
Personal Income Tax (^)	2.1336%	No	No
Value-Added Tax (^)	2.3266%	No	No
Excise Duties (^)	2.9220%	No	No

(\*) The only tax assigned to provinces is a surtax on the Local Business Tax.

(\*\*) This is an optional tax. Municipalities can choose not to levy it.

(^) This sharing applies only to large cities in the ACs under the common region: Cities with a population larger than 75,000 inhabitants, and also the capital cities of all provinces or of the ACs, regardless of their population size.

Source: Authors' elaboration.

#### **4. Database**

The database consists of the information provided by the 2015 wave of the Fiscal Barometer. This is a yearly survey carried out by the Spanish Institute for Fiscal Studies (Ministry of Finance) since the early nineties. The survey gathers citizens' opinions and attitudes on various topics related to public sector activity: assessment of public services and benefits, attitude towards tax evasion, image of the Tax Agency, etc. The population under study is citizens aged 18 or over, residing in Spain, and including up to 10% of immigrants. The Barometer is a nationally and regionally representative sample of 3,000 individuals, elected each year from the represented population and stratified by economic activity, autonomous community and the size of the municipality of residence (Goenaga Ruiz de Zuazu & Pérez López, 2011; Área de Sociología Tributaria, 2016).

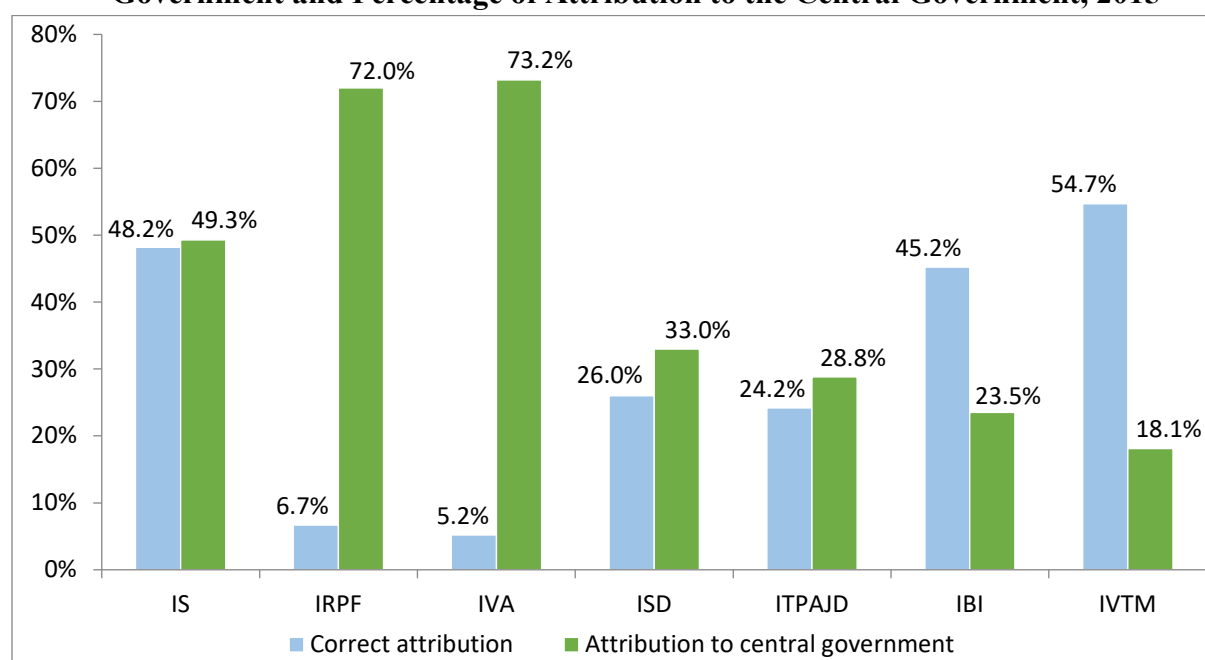
Each year the questionnaire includes a special module on a concrete Public Finance topic.

The 2015 wave, as did those of 2005, 2007, and 2010, interviewed Spanish residents on their perceptions about the attribution of expenditure and taxing responsibilities between levels of government. Though waves prior to 2015 have been used to test the determinants of tax visibility (López-Laborda & Rodrigo, 2014), we consider, for the reasons given below, that the 2015 questionnaire is not only the most recent, but also the most suitable for the purpose of this paper, and this is why we had to rule out a pooled cross-section analysis and only exploit 2015 data. First, because the 2005 and 2007 waves completely forget about local taxes and taxes whose revenues exclusively go to regional Treasuries. Second, because in the case of residents in the Basque Country, just the 2015 wave offers the possibility of a purely correct answer, since it is the only questionnaire that includes Provinces as a choice. Third, because the 2010 wave, regarding the IRPF and IVA, does not offer the purely correct answer, which would be that tax revenues coming from both taxes are benefiting more than one level of government, including local entities. And fourth, because the question of the attribution of tax revenues in every wave but the 2015 one goes as follows: “What level of government do you pay the  $T$  tax?”. The interpretation of such a question is not straightforward, since both the central Tax Agency and each foral tax agency collect the IRPF and IVA, whose revenues are shared between different levels of government. In the 2015 wave, the question on the attribution of tax revenues is far more accurate and as follows: “What level of government is the recipient of  $T$  tax revenues?”

Figure 1 shows the shortcomings in the attribution of tax collection to each level of government in Spain in 2015, a persistent pattern over time (López-Laborda & Rodrigo, 2014; Herrero Alcalde et al., 2015), which, contrary to what is seen with respect to spending powers (Área de Sociología Tributaria, 2016), seems to affect Spaniards homogeneously across the whole country (León, coord., 2015) – that is, regardless of whether the respondent resides in a

foral or common regime AC. Only 5-7% of citizens know how the proceeds of the two most important taxes in the Spanish tax system, IRPF and IVA, are allocated among levels of government. More than 70% of residents still believe that these taxes are received in full by the central level. The explanation may lie, at least in part, in the fact that, as we have seen in Section 3, these two taxes are managed by the central Tax Agency (with the exception of the foral communities), which then remits to each government its share of the collection.

**Figure 1. Percentage of Accurate Attribution of Taxes to the Different Levels of Government and Percentage of Attribution to the Central Government, 2015**



Source: Authors' elaboration with data from the Spanish Institute for Fiscal Studies' Fiscal Barometer.

The visibility of ITPAJD and ISD is much higher, although it is less than 30%. This higher percentage is probably due to the fact that the ACs regulate and manage these taxes and keep all of their collection. However, an even higher percentage of citizens believe that the receipts of these two taxes go entirely to the central government.

As expected, the percentages of correct attribution of the IBI and IVTM exclusively to local corporations are higher, 45% and 55%, respectively, and 36% of people know that both

taxes are local. However, these figures are still low, given that these taxes have been part of municipal budgets for decades and that the municipal powers to regulate and manage them seem much clearer and more visible than in regional taxes, and also considering the link between these taxes (especially the IBI) and the services provided by the municipalities. The percentage of citizens who wrongly attribute these taxes to the central level is around 20%.

As with local taxes, there is also a relatively high percentage of citizens (48%) who correctly attribute the collection of IS. However, in view of what happens with the other taxes, we are left wondering how much of this percentage is due to citizens' genuine knowledge and how much is due to the fact that, as we have seen for the other taxes, many people continue inertially thinking that all taxes belong to the central level.

Ultimately, for a better identification of the level of government entitled to a tax collection, the fact that the government manages the tax seems to matter more than the salience of the tax itself (Chetty, 2009; Chetty et al., 2009). Although (as we have explained above) the figures should be compared with caution, it seems that residents in Spain are less and less able to correctly identify the governments that receive revenue from IRPF and IVA, although the visibility of the IS has improved. The visibility of local taxes has not changed significantly over time (Área de Sociología Tributaria, 2006, 2008, 2011, 2016).

According to the 2015 wave of the Fiscal Barometer, the (in)visibility issue is less important on the services side. In general, citizens correctly identify that the central level is responsible for unemployment benefits and pensions and local authorities for public lighting and waste collection. The percentages are lower, at around 50%, in the case of education and health services. Here it should be borne in mind that the provision of the latter services is actually a competence shared with the central government (*competencia concurrente*): the central

government is responsible for establishing the basic rules that should govern the provision of these services throughout Spain, and each AC is responsible for developing upon these basic rules, setting the rules applicable in its territory, and providing these services in its territory. This probably makes it less clear to the citizen what the responsibility of each level of government is for the provision of these services.

## **5. Specifications**

Our aim is to find the explanatory factors of Spaniards' ability to correctly identify the distribution between the central government, the ACs and the municipalities of the seven taxes referred to above, namely Corporate Income Tax (IS), Personal Income Tax (IRPF), Value Added Tax (IVA), Inheritance and Gift Tax (ISD), Capital Transfer Tax, Taxes on the Raising of Capital, and Stamp Duties (ITPAJD), Property Tax (IBI) and Vehicles Tax (IVTM). To this end, we propose four hypotheses, which we will explain in depth below, in which we incorporate a set of individual and institutional/contextual factors whose influence on the visibility of the distribution of expenditure and tax responsibilities has been confirmed in the literature (Section 2), but also other variables directly related to the specific features of the assignment of tax responsibilities in Spain and their exercise by the different governments (Section 3).

As explained in Section 2, literature has emphasized the difficulty of identifying the governments responsible for each policy in complex decentralized or federalist settings, such as the Spanish one. Therefore, any factors that help citizens navigate this complexity will tend to enhance their understanding of the distribution of taxes between levels of government. Accordingly, the probability of correctly identifying which level of government is the recipient of any given tax should be higher for:

*H1) citizens that use public services or receive public benefits provided by this level of*

*government, as well as those citizens with a greater degree of visibility on the expenditure side regarding that same level of government;*

*H2) citizens that accurately identify other taxes whose revenues finance the same level of government;*

*H3) citizens living in subcentral jurisdictions where governments exert their taxation powers, either to modify the tax rate or to pass tax credits or allowances; and*

*H4) citizens with favourable views about public intervention.*

In order to test the hypotheses above, and given the hierarchical structure of the data (with observations nested at various levels), we propose the following multilevel specification for each of the seven taxes under study:

$$(1) \quad 'T'TAXVISIB_{ij} = X_{ij}\beta + Z_{ij}\gamma + \mu_{ij} + \eta_j$$

where the sub-index  $i$  denotes the individual and  $j$  their region of residence;

' $T'TAXVISIB_{ij}$  is the endogenous variable;  $X_{ij}$  is a vector of variables of interest stemming from the hypotheses defined above;  $Z_{ij}$  is a vector of control variables,  $\mu_{ij}$  (with mean 0 and variance  $\sigma_u^2$ ) is an error term for the individual level (level 1), and  $\eta_j$  (with mean 0 and variance  $\sigma_\eta^2$ ) is an error term for the regional level (level 2). In the literature, this type of specification is known as a random intercept model.

The endogenous variables for each of the estimated specifications are the following ones:

*ISVISIB*: a dummy variable taking a value of 1 if the individual correctly attributes Corporate Tax revenues i) to the central government if the subject lives in regions under the common regime, ii) to the region if the subject lives in Navarre, or iii) to Provincial

Governments if the subject lives in the Basque Country; and 0 otherwise.

*IRPFVISIB/ IVAVISIB*: a dummy variable taking a value of 1 if the individual correctly attributes these tax revenues i) to more than one level of government if the subject lives in regions under the common regime, ii) to the region if the subject lives in Navarre, or iii) to Provincial Governments if the subject lives in the Basque Country; and 0 otherwise.

*ISDVISIB/ ITPAJDVISIB*: a dummy variable taking a value of 1 if the citizen correctly attributes these tax revenues i) to ACs if the subject lives in any region but the Basque Country, or ii) to Provincial Governments if the subject lives in the Basque Country; and 0 otherwise.

*IBIVISIB/ IVTMVISIB*: a dummy variable taking a value of 1 if the individual correctly attributes these tax revenues to the local level, and 0 otherwise.

The vector of independent variables consists of five groups of variables. The first four are correlatively aimed at testing the four hypotheses defined above. The last group makes up the vector of controls that are common to all specifications, namely socio-demographic variables which, according to the literature reviewed, could also partly explain citizens' greater or lesser tax visibility. Then, we detail and justify the variables included in each of the five aforementioned groups.<sup>3</sup>

It should be noted that, although we attempt to test the same hypotheses with the seven specifications indicated above, the variables used for this cannot always be the same, given the differences that exist in the allocation of taxes. For example, we think that, if a government

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<sup>3</sup> With respect to the set of variables presented in each specification, and before carrying out the estimates of the different models, a diagnosis of a possible multicollinearity problem between the regressors has been carried out, obtaining an estimate of the so-called variance inflation factor (*VIF*). According to Netter et al. (1990), if the explanatory variable  $X_j$  presents a  $VIF_j > 10$  we can conjecture a high collinearity of that regressor with the others, so it is advisable to remove it from the different specifications. In our case, this calculation has only been problematic with the *BUSINESS* variable, so, as explained in the results tables 3, 4 and 5, we have discarded this regressor in any of the specifications presented, thus eliminating any subsequent problem of multicollinearity in the later estimates.

exercises its regulatory powers over a certain tax that it has been assigned, its citizens are more likely to identify that government as the recipient of that tax revenue (H3). To test this hypothesis, we constructed different variables of the exercise of these powers for different taxes. Table A1 in Annex explains how each variable has been constructed. Table A2 shows the descriptive statistics for all the variables considered.

### ***5.1 Variables related with public services and benefits visibility***

Our first hypothesis is that visibility on the expenditure side can increase visibility on the tax side. Thus, if citizens correctly identify the governments that provide public services, it should be more likely that they will also correctly identify the governments that collect the taxes that finance those services. López-Laborda and Rodrigo (2014) have found that this hypothesis works in both directions: tax visibility also favours expenditure visibility. So, we construct three dummies, representative of the visibility of central unemployment and pension services (*CENTRALEXPVISIB*), regional education and health services (*REGEXPVISIB*) and local public lighting and garbage collection services (*LOCALEXPVISIB*). We attribute a positive expected sign to the coefficients of these variables.

In the same way, if citizens use public services or receive public benefits, it is more likely that they will correctly identify the administration that provides and, consequently, finances them (López-Laborda & Rodrigo, 2014; León, coord, 2015; Herrero Alcalde et al., 2018). The following discrete variables reflect this link, again with a positive expected sign for their coefficients: *UNEMPLOYUSER*, *EDUCATIONUSER*, *HEALTHUSER*.

There is still another group of factors which we can associate with a greater expenditure and tax visibility. First, we claim that an increase in the disclosing of public information (*TRANSPARENCY*) may be associated to a greater level of visibility (López-Laborda & Rodrigo,

2014). Second, regional TV channels devote a greater attention to regional issues, namely about regional government actions, thus, indirectly teaching about the distribution of responsibilities between levels of government. Therefore, citizens living in regions where regional public TV channels do not exist (*NOREGIONALTV*) may have a greater lack of visibility (Cutler, 2008; Ben-Porath & Shaker, 2010; López-Laborda & Rodrigo, 2015; Wilson & Hobolt, 2015; Herrero Alcalde et al., 2018). Third, citizens living in regions that experienced a high level of devolution from the very beginning of the decentralization process also showed an earlier preference for decentralization. Moreover, these regions exert powers on health and education well before the rest of ACs. Therefore, it can be expected that citizens living in these regions (*HIGHLEVEL*) show a higher level of visibility (Lago Peñas & Lago Peñas, 2010, 2013; León, 2011; López-Laborda & Rodrigo, 2014, 2015). And fourth, an absolute government (*MAJORITY*) can favour a more crystal-clear exercise of regional competences, so citizens may relatively better perceive the current distribution of responsibilities between levels of government (Lago Peñas & Lago Peñas, 2010). However, it can also be argued that a government with such a majority may have more room for manoeuvre to obscure, if doing so suits it, the allocation of powers among levels of government. Consequently, we cannot assign an a priori sign to the coefficient of this variable.

## ***5.2 Variables related with other taxes visibility***

Our second hypothesis is that citizens do not have an isolated knowledge of the taxes raised by each level of government. Citizens who are able to attribute revenues stemming from one tax to a concrete level of government may be better able to attribute to that government revenues from other taxes that are also assigned to it. This hypothesis has so far not been tested in the literature. Since, as seen in Section 4, a large part of Spanish people think that all taxes are central (Figure 1), it is only worth testing this hypothesis for regional and local taxes. So, we construct two variables representing whether a citizen adequately identifies regional and local

taxes: *REGTAXVISIB*, *LOCALTAXVISIB*. We assign a positive sign to their estimated coefficients.

Moreover, non-taxpayers do not relate themselves to taxation issues, namely to any Tax Administration, so identifying the recipient of tax revenues should be relatively more difficult for them. This is reflected in the variable *NOTAXPAYER*, to whose coefficient we assign a negative expected sign (López-Laborda & Rodrigo, 2014). In contrast, it can be conjectured that people living in the only four self-financing ACs (Madrid, the Balearic Islands, Navarre, and the Basque Country) are more aware of the allocation of taxes among government levels than residents in other regions. So, we construct the variable *SELFFINANCING*, with a positive expected sign (López-Laborda & Rodrigo, 2014).

In addition to the previous variables, we also include in this group the previously defined variables *TRANSPARENCY*, *IBIVISIB* and *IVTMVISIB*, with the expected signs already provided.

### ***5.3 Variables related with the exercise of taxation power***

Our third hypothesis is that any government amending the tax code informs its citizens that it is responsible for raising revenues stemming from that concrete tax, which should increase tax visibility. So far, this hypothesis has not been considered in the literature either. We do not test this hypothesis for local governments, as they have historically enjoyed powers to regulate local taxes and all municipalities exercise them. On the one hand, we construct the variables *NOINHERITTAX* and *NOGIFTTAX*, which reflect whether the individual lives in an AC where no ISD is collected for inheritances or gifts to close relatives, respectively. We expect this action by the regional government to increase the visibility of the regional nature of the ISD. On the other hand, we construct the variables *REGIRPF RATE* and *REGITPAJD RATE*, which represent the top marginal tax rate applied by ACs in IRPF and ITPAJD, respectively. We expect that a

higher tax rate will be associated with a higher visibility of the government responsible of the respective tax.

In addition, as we have seen in Section 3, foral regions have greater taxation powers than common regime ACs on the management, yield and regulation of taxes. Therefore, it may be expected that visibility in foral regions (*FORAL*) may be also higher (López-Laborda & Rodrigo, 2014, 2015; León, coord., 2015; León & Orriols, 2016; Herrero Alcalde et al. 2018).

#### ***5.4 Variables related with preference for public intervention***

The fourth and final hypothesis we propose is that, according to the literature (León & Ferrín, 2007; López-Laborda & Rodrigo, 2014), citizens with a positive preference for public intervention have a deeper knowledge about the public sector and, therefore, show a higher probability of knowing relatively better which level of government gets each tax's revenues. We try to test this hypothesis with the following three variables. The first, *PUBLICSECTOR*, captures whether citizens think that the public sector performs a necessary social function. Second, *REDISTRIBUTION* represents whether citizens think that one of the main objectives of public intervention is the reduction of inequality. We attribute a positive expected sign to the coefficients of these two variables. And third, *POPULARPARTY* captures if citizens live in a region governed by the Popular Party, PP. Presumably, the representatives of the Popular Party are elected in territories with a lower taste for public intervention. Hence, we hypothesize that this fact could be associated with a lower knowledge of the division of taxation (and expenditure) powers across levels of government (León & Ferrín, 2007; León, 2010, 2011, 2012; Lago Peñas & Lago Peñas 2013; López-Laborda & Rodrigo, 2015).

#### ***5.3 Individual socio-demographic variables***

The vector of control variables, common to all specifications, consists of a set of socio-demographic variables, common in the literature (as detailed in Section 2), that try to collect all

the social and individual heterogeneity reported by the 2015 wave of the Fiscal Barometer: the age of the individual (*AGE*, *AGE*<sup>2</sup>), sex (*FEMALE*), civil status (*COUPLE*), origin (*INMIGRANT*), residence (*BIGCITY*, *RURAL*), education (*SECEDUCATION*, *TERTEDUCATION*, *UNIVERSITY*), and work status (*BUSINESS*, *SALARIED*, *UNEMPLOYED*, *RETIRED*). Table A1 details the construction of these variables and the expected signs of their respective coefficients.

## 6. Estimates and Results

### 6.1. Baseline scenario

We have successively estimated the seven specifications summarized in (1) considering and disregarding the hierarchical structure of the data, i.e., in this second case, not including an additional error term for the regional level.<sup>4</sup> In order to determine which of the two estimates has a higher explanatory capacity, a conventional LR test is performed to confirm that, in all cases, the explanatory capacity of the multilevel models is greater than that of models that do not consider the hierarchical structure of observations. Consequently, Table 3 shows only the results obtained in the estimates of the multilevel models. This table also includes, for each estimated model, the value of  $\rho$ , the intraclass correlation coefficient, which indicates the percentage of the unexplained total variability of each endogenous variable that is attributable to the heterogeneity existing between ACs.

We also include a set of figures associated with each endogenous variable (Figures A1 in Annex), which detail the predicted probability of correctly attributing each tax analyzed for each

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<sup>4</sup> An issue to be clarified prior to conducting the multilevel analysis is whether the number of level 2 groups available (in our case, regions) is large enough for the estimates achieved to have the properties generally demanded from an econometric point of view, bearing in mind that the estimates are based on maximum likelihood methods. According to Heck and Thomas (2000), the above requirement would be met with at least 20 different groups at level 2, and with a minimum of 30 observations within each group. In our case, the number of level 2 groups is 17, and the lowest number of level 1 observations is 28 (in La Rioja), with a maximum of 551 (in Andalucía), so we believe that compliance with these statistical requirements is reasonably achieved.

AC, considering both the explanatory variables introduced explicitly and the estimated random regional effects.<sup>5</sup>

In all estimates, the procedure we have followed is the so-called *backward stepwise regression*, which gradually eliminates variables until getting a reduced model which best explains the data.

**Table 3. Results of the Estimates for the Endogenous Variables, Baseline Scenario**

Dependent Variable	IS VISIB	IRPF VISIB	IVA VISIB	ISD VISIB	ITPAJD VISIB	IBI VISIB	IVTM VISIB
<i>Visibility of public services and benefits (H1)</i>							
CENTRALEXPVISIB	1.17***						
REGIONALEXPVISIB				0.41***	0.39***		
LOCALEXPVISIB						1.41***	1.02***
UNEMPLOYUSER	-0.28**						
EDUCATIONUSER							
HEALTHUSER							
TRANSPARENCY		1.67***	1.22**				
NOREGIONALTV							
HIGHLEVEL							0.33**
MAJORITY	0.85***			0.42**	0.15**	-1.21***	
<i>Tax visibility (H2)</i>							
REGTAXVISIB		1.71***	1.67***	1.65***	1.71***		
IBIVISIB							1.17***
IVTMVISIB						2.00***	
LOCALTAXVISIB							
NOTAXPAYER					-0.24*		-0.32***
SELFFINANCING							
<i>Exercise of taxation powers (H3)</i>							
REGIRPF RATE							
REGITPAJD RATE							
NOINHERITTAX							
NOGIFTTAX							
FORAL	-1.28***	3.07**	2.24***				
<i>Preference for public intervention (H4)</i>							

<sup>5</sup> As can be seen in the different figures, in some cases, the inclusion of regional effects improves the probability of a correct attribution predicted only by the explanatory variables of the model, while in other cases, it worsens it. For example, figure A1.2 shows that the predicted probability of accuracy in attributing IRPF for the citizens of Navarre is just over 30%. Six percentage points of that probability are explained by a regional effect not captured by the fixed part of the model (i.e., attributed to the random intercept). If, by contrast, we look at the same figure for citizens in the Basque Country, the probability of a correct attribution of the tax predicted by the multilevel model is 17%, but in this case the regional random effect worsens the visibility predicted by the fixed part of the model by five percentage points.

PUBLICSECTOR						0.29**	
REDISTRIBUTION	0.22***						
POPULARPARTY	-0.39*						
<i>Sociodemographic characteristics</i>							
AGE	0.07***						
AGE <sup>2</sup>	-0.0008***						
FEMALE							
COUPLE				0.10*			
INMIGRANT					-1.07***	-1.39***	
BIGCITY						0.52***	
RURAL							
TERTEDUCATION		0.66***				0.40***	
SECEDUCATION				0.37***			
RETIRED							
UNIVERSITY						-0.68***	-0.27*
SALARIED							
UNEMPLOYED							
CONSTANT	-2.01***	-5.22***	-5.12	-2.03***	-1.68***	-3.05***	-1.26***
Observations	2.977	2.977	2.977	2.977	2.977	2.977	2.977
LR $\chi^2$	1,010.65	179.53	129.91	2,266.17	1,162.99	986.38	852.51
Prob > $\chi^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log pseudolikelihood	-1,940.3652	-643.86551	-547.61272	-1,213.247	-1,143.9354	-1,621.7532	-1,609.4064
Coefficient $\rho$	0.014231	0.213565	0.0842259	0.0809096	0.0451924	0.0557836	0.0513762
LR test vs. unilevel (probit/logit) regression	16.57 (0.00)	47.21 (0.00)	7.94 (0.00)	36.40 (0.00)	7.86 (0.00)	50.93 (0.00)	46.23 (0.00)

BUSINESS has not been finally included in the estimates because multicollinearity problems related to the use of this variable have been found

\*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%

Source: Authors' elaboration.

In what follows, we carry out a joint analysis of the results reflected in Table 3, highlighting, when necessary, the particularities related to some tax or group of taxes. With the exceptions that we will indicate in due course, all the coefficients of the variables have the sign that we have attributed to them in the previous Section.

In view of the estimates, it can be argued that there is some empirical evidence to support the fulfilment of the first two hypotheses we have put forward. First (with the exception of the estimates for IRPF and IVA), if citizens know which level of government provides certain services, it is more likely that they will also know the taxes received by that same level of

government (H1). However, there is strikingly no evidence that being a user of a service increases the visibility of taxes: only the coefficient of the variable *UNEMPLOYUSER* in the estimate referring to the IS is significant, but, surprisingly, with a negative sign, contrary to the expected one. The increase in the transparency of regional governments raises the probability of correctly identifying the allocation of IRPF and IVA between levels of government. It should also be noted that, in almost all estimates, visibility increases when the regional government has an absolute majority. In general, the existence of a majority regional government significantly favours tax visibility, according to the literature. Other variables potentially related to a greater regional identity and greater information gathering, such as *NOREGIONALTV* and *HIGHLEVEL*, have not presented significant coefficients (except for the second variable, in the estimate of visibility of the IVTM).

Second, the probability of correctly identifying the government that receives a tax receipt also increases if individuals correctly identify other taxes that finance that same level of government (H2). Moreover, in the estimates of the visibility of ITPAJD and IVTM, visibility decreases if the citizen is not a tax filer (*NOTAXPAYER*). However, the coefficients of the variable *SELFFINANCING*, which reflects whether an AC is financed from its own revenues without the need to receive transfers from the central level, have not proved to be significant. This result could be interpreted in the sense that what is relevant is not so much the volume of taxes received as their quality, that is, the powers that can be exercised over those taxes. However, in the light of our estimates, neither does the exercise of regulatory powers over taxes, nor their amount, appear to contribute to increasing their visibility, contrary to the hypothesis we have put forward above (H3). Only the coefficients of the *FORAL* variable are significant in some models. It is worth looking more closely at the results related to this last variable.

As Table 3 shows, if the citizen resides in a foral community, the probability of correctly identifying the allocation of IRPF and IVA increases. In the same vein, figures A1.2 and A1.3 show that Navarre and the Basque Country are among the ACs with the highest predicted probability of accuracy in the attribution of these taxes. However, and curiously, living in a foral community reduces the probability of properly identifying that the IS is a foral revenue. As Figure A1.1 shows, these two regions are the ones with the lowest predicted probability of accuracy in the attribution of this tax. We will return to this result later. As regards the other two regional taxes, the ISD and the ITPAJD, the coefficients of the *FORAL* variable are not significant, probably because common regime ACs can exercise in these taxes practically the same competences as the foral regime ACs, in terms of revenue, management and regulation (see Table 1). Figures A1.4 and A1.5 show a high predicted probability of correctly attributing these taxes in the case of Navarre, and a low one in the Basque Country. As we will explain later, this last result may be related to the fact that in Navarre these two taxes are regional, whereas, as explained in Section 3, in the Basque Country they are provincial, although citizens attribute them (understandably) to the AC.

Neither do the estimates support the view that the preference for public intervention improves the visibility of the allocation of taxes (H4), except, distinctly, in the case of the IS, whose correct attribution is more likely if citizens think that one of the main objectives of public intervention is redistribution and if they live in a region not governed by the PP. The proper attribution of the IBI also improves if citizens think that the public sector performs a necessary social function.

Finally, with regard to the socio-demographic control variables, the only regularity we can detect is that a higher level of education increases the probability of correctly identifying the

assignment of taxes between levels of government, although being a college student reduces that probability for local taxes, presumably, because the student is unlikely to be a taxpayer of any of these taxes.

As can be observed in Table 3, the coefficient  $\rho$  of intraclass correlation is especially high in the estimate of IRPF: 21.4% of the unexplained total variability in the visibility of this tax is attributable to the unobservable heterogeneity existing among ACs.

Although we have already warned in Section 4 of the difficulty of carrying out comparisons, due to the non-minor differences that exist between the Fiscal Barometers on which each research is based, some of the results obtained in López-Laborda and Rodrigo (2014), only for IRPF and IVA, and for a pool of the years 2005, 2007 and 2010, are maintained in this research, such as the importance of the foral regime, the transparency of governments and the education level of citizens to increasing the visibility of tax allocation among levels of government.

## **6.2. *Additional scenarios***

To complete the previous exercises, in this subsection we perform two sets of complementary estimates. First, in the estimates presented in the previous subsection we have dealt with identifying the factors that explain why citizens are able to attribute a particular tax to the level of government that receives its collection. Now we are interested in determining the profile of those individuals who are able to correctly identify the allocation of most taxes received by the central, regional and local levels of government.<sup>6</sup> To this aim, we define the following three endogenous variables:

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<sup>6</sup> There are hardly any individuals who correctly identify the allocation between levels of government of all the taxes we are considering: only 0.38% of citizens correctly identify the government that receives the yield of the seven taxes included in the analysis, while 1.89% correctly identify the allocation of at least six of these taxes.

*TOPNOTCHVISIB*: a dummy variable taking a value of 1 if the individual correctly attributes revenues from at least five of the seven taxes analyzed (where one of the five must be the IS), at least three regional taxes and at least one local tax; and 0 otherwise.

*REGIONALTAXVISIB*: a dummy variable taking a value of 1 if the individual correctly attributes to regions (or to provinces, in case of subjects living in the Basque Country) the revenues from at least three of the four following taxes: IRPF, IVA, ISD, ITPAJD; and 0 otherwise.

*LOCALTAXVISIB*: as defined above, a dummy variable taking a value of 1 if the individual correctly attributes IBI and IVTM to the local level of government, and 0 otherwise.

As can be seen in Table A2, the average values of these three variables are very low. Only 2% of citizens have an accurate knowledge of the allocation of the returns of most of the taxes included in the analysis (*TOPNOTCHVISIB*=1), while the percentage is 3% if visibility is focused on regional taxes (*REGIONALTAXVISIB*=1). As might be expected, the correct attribution is significantly higher for local taxation, as the percentage in this case reaches a value of 36% (*LOCALTAXVISIB*=1).

We have re-estimated the specifications (1) for each of these endogenous variables, with the variables of interest and the control variables already indicated. According to the values of the LR test, the explanatory capacity of the multilevel model is greater than that of the model without a hierarchical structure of the observations for the endogenous variables *TOPNOTCHVISIB* and *LOCALTAXVISIB*, but not for *REGIONALTAXVISIB*. Consequently, Table 4 presents only the results of the model selected in each case. Figures A2 shows the probabilities predicted by the estimated multilevel models for each AC and detailing, if relevant, the probability explained by the idiosyncratic regional effects not captured by the rest of the

variables introduced in each specification.

**Table 4. Estimates Results for the Endogenous Variables, Citizens with High Tax Visibility**

Dependent Variable	TOPNOTCH VISIB	REGIONALTAX VISIB	LOCALTAX VISIB
<i>Visibility of public services and benefits (H1)</i>			
CENTRALEXPVISIB			
REGIONALEXPVISIB	0.99*	1.80**	
LOCALEXPVISIB			1.05***
UNEMPLOYUSER			
EDUCATIONUSER			
HEALTHUSER			
TRANSPARENCY		1.92***	
NOREGIONALTV		2.38***	
HIGHLEVEL			
MAJORITY		2.30**	
<i>Tax visibility (H2)</i>			
REGTAXVISIB			
IBIVISIB			
IVTMVISIB			
LOCALTAXVISIB	0.84***	1.66***	
NOTAXPAYER			
SELFFINANCING		3.02***	
<i>Exercise of taxation powers (H3)</i>			
REGIRPFRATE			
REGITPAJDRATE			
NOINHERITTAX		-1.87***	
NOGIFTTAX			
FORAL	1.50***		
<i>Preference for public intervention (H4)</i>			
PUBLICSECTOR		1.32*	
REDISTRIBUTION			0.15*
POPULARPARTY		-1.65***	
<i>Sociodemographic characteristics</i>			
AGE			
AGE <sup>2</sup>			
FEMALE		-0.69*	
COUPLE			0.23***
INMIGRANT			-0.78***
BIGCITY			
RURAL			
TERTEDUCATION	5.21***	2.77**	0.25***
SECEDUCATION	4.98***	1.90*	
RETIRED		1.14***	
UNIVERSITY			-0.71***
SALARIED			
UNEMPLOYED			
CONSTANT	-8.77***	-10.29***	-1.61***

Observations	2.977	2.977	2.977
<i>LR</i> $\chi^2$	425.33	81.17	237.50
<i>Prob</i> > $\chi^2$	0.00	0.00	0.00
Log pseudolikelihood	-173.84762	-278.42312	-1,808.3442
Coefficient $\rho$		0.3175	
<i>LR</i> test vs. unilevel (probit/logit) regression	0.1556933		0.1083202

BUSINESS has not been finally included in the estimates because multicollinearity problems related to the use of this variable have been found

\*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%

Source: Authors' elaboration.

The profiles of the citizens who correctly identify the entitlement to most of the taxes studied (central, regional, and local) and to the two local taxes do not differ significantly from the characteristics we have detected in the estimates summarized in Table 3. First, the probability of correctly attributing the revenues of most taxes increases when citizens correctly identify some service provided by the regional level, when they correctly attribute the IBI and the IVTM to the local level, when they reside in a foral community (which corroborates Figure A2.1), and if they have completed high school or university. Second, the probability of correctly attributing the revenue of the two local taxes increases when citizens identify some service provided by the local level, when they favour the redistributive function of the public sector, when they are married and when they have a college education; the probability decreases for immigrants and for college students. In both models, the intraclass correlation coefficient is high: 15.6% in the *TOPNOTCHVISIB* estimate and 10.8% in the *LOCALTAXVISIB* estimate.

However, the profile of citizens who correctly attribute the receipts of most regional taxes is more complex. The four hypotheses we have proposed help to explain the visibility of regional taxes, although, in a couple of cases, in a direction contrary to that expected. On the one hand, not having regional public TV in a region increases the probability of a better visibility, which can perhaps be interpreted to mean that regional TV can also be used to make the division of

competences between governments more obscure. On the other hand, living in regions that have abolished inheritance tax among close relatives reduces the probability of a correct visibility of most regional taxes. It seems that the practical non-existence of the tax affects citizens' perceptions more than the fact that it was their regional government that passed this measure.

The second set of complementary estimates directly affects the treatment we have given so far to individuals living in the Basque Country. In the definition of the dependent variables in Section 5 we have only imputed value 1 if the residents of the Basque Country attribute the taxes (except the local ones) to the provincial governments, which are the true beneficiaries of all the tax competences. This is correct, but it probably leaves out many individuals who attribute taxes, not to the central government (as residents in the common regime ACs wrongly do), but to their own AC, which is an understandable error.

To examine whether and in what direction the results obtained so far change, we have re-estimated all the models, but now assigning a value of 1 to the dependent variables if Basque Country residents attribute the tax to the provincial governments or to their AC. Therefore, we do not re-estimate the models including local taxes since these are not affected by the new definitions of the endogenous variables. The results are presented in Table 5 and Figure A3. The multilevel structure has more explanatory capacity in the estimates of the visibility of each of the five taxes, but not in the two additional estimates of visibility of most of the taxes (*TOPNOTCHVISIB* and *REGIONALTAXVISIB*).

**Table 5. Results of the Estimates for the Endogenous Variables, Alternative Definitions for the Endogenous Variables of Basque Country Citizens**

Dependent Variable	IS VISIB	IRPF VISIB	IVA VISIB	ISD VISIB	ITPAJD VISIB	TOPNCH VISIB	REGTAX VISIB
<i>Visibility of public services and benefits (H1)</i>							
CENTRALEXPVISIB	0.98***						
REGIONALEXPVISIB		0.74***		0.44***	0.41***	2.43***	0.79***
LOCALEXPVISIB							
UNEMPLOYUSER	-0.27**					0.99*	
EDUCATIONUSER							
HEALTHUSER							0.58**
TRANSPARENCY		1.70**	1.30**				0.66***
NOREGIONALTV							
HIGHLEVEL						-2.06***	
MAJORITY					0.31*	3.89***	
<i>Tax visibility (H2)</i>							
REGTAXVISIB							
IBIVISIB		1.57***	1.70***	1.65***	1.71***		
IVTMVISIB							
LOCALTAXVISIB							
NOTAXPAYER						1.92***	0.51***
SELFFINANCING					-0.25*		
<i>Exercise of taxation powers (H3)</i>							
REGIRPF RATE							
REGITPAJD RATE					-4.54***		
NOINHERITTAX							
NOGIFTTAX							
FORAL		4.09***	2.99***			5.08***	2.40***
<i>Preference for public intervention (H4)</i>							
PUBLICSECTOR							
REDISTRIBUTION	0.19**						
POPULARPARTY						-2.27***	
<i>Sociodemographic characteristics</i>							
AGE	0.07***						
AGE <sup>2</sup>	-0.0008***	0.0001**					
FEMALE							-0.36**
COUPLE				0.10*		0.88*	
INMIGRANT					-0.86***	-3.28**	
BIGCITY	-0.27*						
RURAL							
TERTEDUCATION	0.34***	0.58*			0.16***	2.44**	1.11***
SECEDUCATION	0.25***			0.32***		2.21**	0.64**
RETIRED						1.23**	0.73***
UNIVERSITY							
SALARIED							
UNEMPLOYED							
CONSTANT	-2.22***	-5.71***	-5.08***	-1.93***	-1.29***	-9.84***	-4.54***

Observations	2.977	2.977	2.977	2.977	2.977	2.977	2.977
<i>LR</i> $\chi^2$	335.36	973.75	96.44	2,670.21	1,322.19	106.25	140.07
<i>Prob</i> > $\chi^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Log pseudolikelihood	-1,978.9535	-658.42712	-577.10307	-1,229.8089	-1,152,1732	-184.98566	-310.94954
Coefficient $\rho$						0.4801	0.4205
<i>LR</i> test vs. unilevel (probit/logit) regression	0.0294052	0.1938356	0.104141	0.0671093	0.0446661		

BUSINESS has not been finally included in the estimates because multicollinearity problems related to the use of this variable have been found

\*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%

Source: Authors' elaboration.

As might be expected, given the relatively small size of the Basque Country in the national aggregate, the results of the estimates are not substantially altered. The most striking point is how the performance of the *FORAL* variable changes. The coefficient of this variable continues to be significant, and with the predicted positive sign, in the estimates of the visibility of the IRPF and the IVA, but it is no longer significant in the estimate of the visibility of the IS. If we look at Figure A3.1, the predicted probability of accuracy in the attribution of this tax has risen considerably in the Basque Country with respect to Figure A1.1, which confirms our hypothesis that the most citizens of this region attribute this tax to the AC. However, Navarre remains behind all the ACs, which leads us to believe that the residents of this region mostly attribute the IS to the central level. As regards the ISD and ITAPJD, the coefficient of the *FORAL* variable is still not significant, but now the predicted probabilities of correct attribution of these taxes are very high in both Navarre and the Basque Country (Figures A3.4 and A3.5), which reinforces our hypothesis that in the Basque Country there is a significant attribution of taxes to the regional level. In all the models referring to the visibility of a regional tax, the Basque Country is the region with the highest predicted probability of correct attribution, with a large difference over the other regions, and in almost all the models it is followed by Navarre (Figures A3.2 to A3.5).

## 7. Concluding Remarks

As opinion polls repeatedly show, most citizens resident in Spain are not able to correctly identify the taxes received by the different levels of government – especially the regional one – to finance their spending powers. This shortcoming makes it difficult for citizens to know with any degree of precision the costs and benefits of the services they receive from the respective public administrations and, accordingly, represents an obstacle to the efficiency gains that the theory of fiscal federalism attributes to effective fiscal decentralization. This lack of knowledge is not a Spanish singularity, since a growing strand of the literature shows that citizens living in federal or devolved countries tend to show persistent difficulties when attributing policies to the correct level of government.

In this paper, we have tried to empirically establish the profile of those citizens who are best able to identify the allocation of taxes between levels of government. Consistent with the hypotheses that we have tested, our estimates suggest that these citizens are those who are able to identify the government that provides the services financed by these taxes, who correctly identify other taxes received by the same government, who reside in a foral region, and who enjoy a high level of education.

The results achieved in this research may be useful for the design of policies directed to improve citizens' knowledge of the allocation of taxes between levels of government in Spain and, in particular, of the taxes allocated to the regional level, which are the least perceptible to citizens (Figure 1). First, since the visibility of public services can help to improve the visibility of taxes, a key step is to improve the visibility of the distribution of functions between levels of government. This is not an easy task, for two reasons. One, because, as seen above, the system of allocation of competences operating in Spain is rather complex, especially with regard to the

most important regional services, education and healthcare. Two, because being a user of a service is probably not enough to perceive which government provides it. Consequently, an effort should be made to better define and simplify the allocation of functions between levels of government and to inform citizens precisely about this allocation. The improvement in the ACs' transparency indicators, recorded by *Transparency International España*, is an appropriate step in this direction.

On the tax side, the main lesson for the visibility of regional taxes can be drawn from the performance of the *FORAL* variable, which represents citizens resident in Navarre and the Basque Country, the regions that enjoy a special tax and financial regime. With all the nuances introduced in the previous Sections, residents in these ACs are those who best perceive the allocation of taxes between levels of government. In addition, the coefficients of the *FORAL* variable are significant when the foral ACs exercise powers over their taxes that are not available to the other ACs, as is the case with IRPF and IVA. Therefore, an expansion of the powers of the common regime ACs on ceded taxes could help to increase the visibility of these taxes. According to our results, it is probably more important for this purpose to increase tax management powers than to extend the regulatory competences (although this extension is very important to strengthen regional financial autonomy). In this regard, it should be recalled, first, that the exercise of regulatory tax powers has not proven to be significant in any case to explain tax visibility; second, that the foral ACs cannot exercise any regulatory powers over IVA, although they do manage it (Table 1); and third, that, in some estimates, the fact of not having any relationship with the tax administrations (which is the case with non-tax filers, college students, and some immigrants) reduces the probability of adequately perceiving which government is entitled to a tax yield (Table 3).

The last action that finds support in our estimates is the improvement of the educational level of the population. More educated citizens are also likely to be more politically sophisticated, i.e., more prepared for and interested in issues related to public intervention (which does not necessarily imply a preference for such intervention), which may contribute to increased visibility in the allocation of expenditure-related competences and taxes among levels of government. The inclusion or reinforcement of specific content on the particular structure and functioning of the Spanish public sector for secondary education students would go in the same direction.

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## Appendix

**Table A1. Independent Variables: Construction and Expected Sign**

Variable	Lev	Construction	Sign
CENTRALEXPVISIB	1	1 if the individual correctly attributes the main responsibility for providing unemployment benefits and/or pensions to the central government, and 0 otherwise.	+
REGIONALEXPVISIB	1	1 if the individual correctly attributes the main responsibility for providing education and/or health services to ACs, and 0 otherwise.	+
LOCALEXPVISIB	1	1 if the individual correctly attributes the responsibility for public lightning and/or garbage collection to the local level of government, and 0 otherwise.	+
UNEMPLOYUSER	1	1 if the individual herself or any individual's family members have benefited during the previous year of unemployment benefits, and 0 otherwise.	+
EDUCATIONUSER	1	1 if the individual herself or any individual's family members have consumed public education during the previous year, and 0 otherwise.	+
HEALTHUSER	1	1 if the individual herself or any individual's family members have consumed public health care services during the previous year, and 0 otherwise.	+
TRANSPARENCY	2	Increase in the economic-financial regional transparency score, elaborated by <i>Transparency International España</i> , between 2014 and 2016: See <a href="https://transparencia.org.es/indice-de-las-comunidades-autonomas-incan/">https://transparencia.org.es/indice-de-las-comunidades-autonomas-incan/</a> .*	+
NOREGIONALTV	2	1 if the individual lives in an AC where regional public TV channels don't exist – Cantabria, Castile and Leon, Navarre and La Rioja – and 0 otherwise.	-
HIGHLEVEL	2	1 if the individual lives in regions that experienced a high level of devolution from the very beginning of the decentralization process, and 0 otherwise.	+
MAJORITY	2	1 if the individual lives in a region with an absolute majority government, and 0 otherwise. This happens only in Galicia.	?
REGTAXVISIB	1	1 if the individual correctly attributes to regions (to provinces in case of subjects living in the Basque Country) revenues from at least one of the remaining regional (or provincial) taxes, and 0 otherwise.	+
LOCALTAXVISIB	1	1 if the individual correctly attributes Property Tax and Vehicle Tax revenues to the local level of government, and 0 otherwise.	+
NOTAXPAYER	1	1 if the individual does not have to submit a tax return (presumably income tax form), and 0 otherwise.	-
SELFFINANCING	2	1 if the individual lives in Madrid, the Balearic Islands, Navarre or the Basque Country, and 0 otherwise.	+
REGIRPF RATE	2	Regional top marginal rate of the IRPF where the individual lives.	+
REGITPAJDRATE	2	Regional top marginal rate of the capital transfer tax where the individual lives.	+
NOINHERITAX	2	1 if the individual lives in ACs where no Inheritance Tax is collected for inheritances to close relatives in 2015 (Cantabria, La Rioja, Madrid, Balearic Islands and Castile-La Mancha), and 0 otherwise.	+
NOGIFTTAX	2	1 if the individual lives in Madrid or Castile-La Mancha, ACs where no Gift Tax is collected for gifts to close relatives in 2015, and 0 otherwise.	+
FORAL	2	1 if the individual lives in a foral region, and 0 otherwise.	+
PUBLICSECTOR	1	1 if individual agrees or strongly agrees with the following statement: "Public Sector exerts a necessary social function"; and 0 otherwise.	+
REDISTRIBUTION	1	1 if the individual agrees or strongly agrees with the following statement: "One of the main objectives of the tax and benefit system must be the reduction of economic inequality"; and 0 otherwise.	+
POPULARPARTY	2	1 if the individual lives in a region governed by the Popular Party, PP (Galicia, Madrid, La Rioja, Murcia and Castile-Leon), and 0 otherwise.	-
AGE / AGE <sup>2</sup>	1	Age of the individual.	+/-
FEMALE	1	1 if the individual is a woman, and 0 otherwise.	?
COUPLE	1	1 if the individual is married or lives with a stable partner, and 0 otherwise.	?
IMMIGRANT	1	1 if the individual is an immigrant, and 0 otherwise.	-
BIGCITY	1	1 if the individual lives in a city with more than 200,000 inhabitants, and 0 otherwise.	+
RURAL	1	1 if the individual lives in a town with less than 10,000 inhabitants, and 0 otherwise.	-
SECEDUCATION	1	1 if the individual's highest level of education is secondary (high school) education, and 0 otherwise.	+
TERTEDUCATION	1	1 if the individual's highest level of education is tertiary (college) education, and 0 otherwise.	+
UNIVERSITY	1	1 if the individual is a university student, and 0 otherwise.	+
BUSINESS	1	1 if the individual is a professional or a businessman, and 0 otherwise.	+
SALARIED	1	1 if the individual is a salaried worker, and 0 otherwise.	+
UNEMPLOYED	1	1 if the individual is unemployed, and 0 otherwise.	-
RETIRED	1	1 if the individual is retired, and 0 otherwise.	+

(\*) The economic-financial score is based on 16 items dealing with budgetary, accountancy, expenditure, and revenue-related issues. We use the annual index at the regional level, because the local level index is only available for the 110 largest Spanish municipalities.

**Table A2. Basic Descriptive Statistics of the Endogenous and Exogenous Variables****Endogenous**

<i>Variable</i>	<i>Mean</i>	<i>Median</i>	<i>Maximum value</i>	<i>Minimum value</i>	<i>Standard deviation</i>	<i>Coefficient of skewness</i>	<i>Coefficient of kurtosis</i>
IRPFVISIB*	0.07/0.08	0/0	1/1	0/0	0.25/0.28	3.46/3.01	12.97/10.04
IVAVISIB*	0.05/0.06	0/0	1/1	0/0	0.22/0.25	4.06/3.54	17.46/13.51
ISVISIB*	0.48/0.50	0/0	1/1	0/0	0.50/0.50	0.07/0.01	1.01/1.00
ITPAJDVISIB*	0.24/0.26	0/0	1/1	0/0	0.43/0.44	1.21/1.11	2.45/2.23
ISDVISIB*	0.26/0.28	0/0	1/1	0/0	0.44/0.45	1.09/1.00	2.19/2.00
IBIVISIB	0.45	0	1	0	0.50	0.19	1.04
IVTMVISIB	0.55	1	1	0	0.50	-0.19	1.04
TOPNOTCHVISIB*	0.02/0.03	0/0	1/1	0/0	0.13/0.16	7.30/5.96	54.32/36.53
REGIONALTAXVISIB*	0.03/0.04	0/0	1/1	0/0	0.17/0.21	5.41/4.42	30.32/20.58
LOCALTAXVISIB	0.36	0/0	1/1	0/0	0.48	0.58	1.34

**Exogenous**

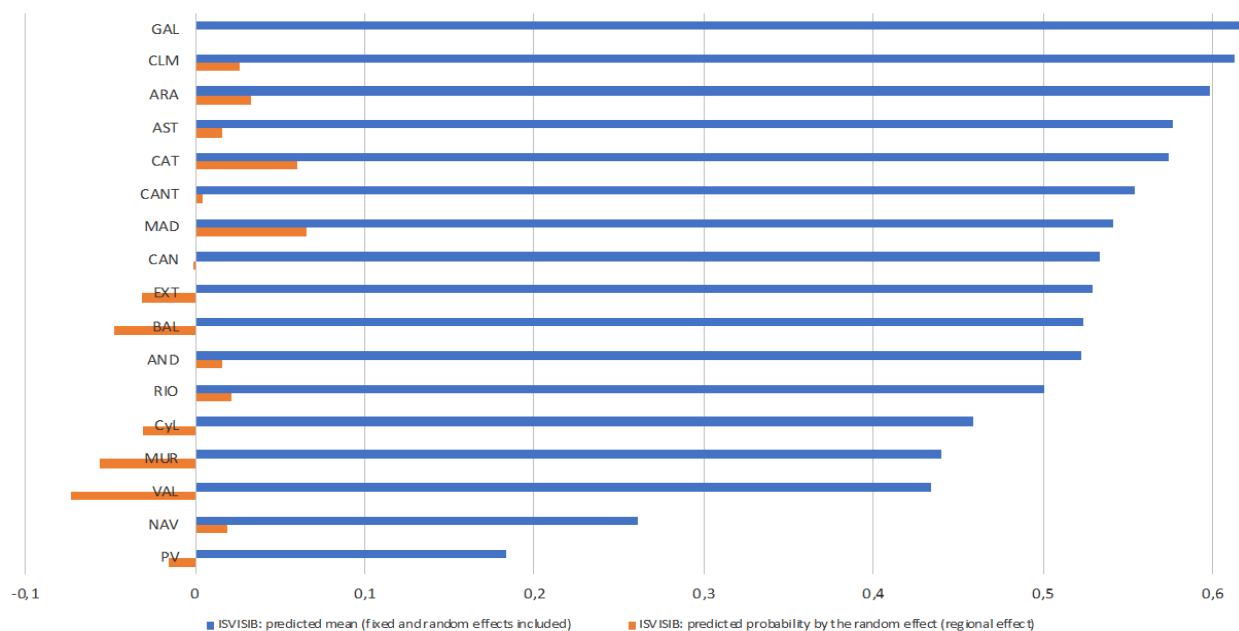
<i>Variable</i>	<i>Mean</i>	<i>Median</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Stand. dev.</i>	<i>Skewness</i>	<i>Kurtosis</i>
CENTRALEXPVISIB	0.90	1	1	0	0.30	-2.63	7.94
REGIONALEXPVISIB	0.59	1	1	0	0.49	-0.37	1.13
LOCALEXPVISIB	0.91	1	1	0	0.29	-2.84	9.04
UNEMPLOYUSER	0.20	0	1	0	0.40	1.49	3.23
EDUCATIONUSER	0.44	0	1	0	0.50	0.23	1.05
HEALTHUSER	0.93	1	1	0	0.25	-3.41	12.65
TRANSPARENCY	0.32	0.26	0.89	-0.11	0.35	0.18	1.42
NOREGIONALTV	0.09	0	1	0	0.29	2.86	9.17
HIGHLEVEL	0.61	1	1	0	0.49	3.63	14.21
MAJORITY	0.06	0	1	0	0.24	3.61	14.04
NOTAXPAYER	0.28	0	1	0	0.45	0.96	1.91
SELFFINANCING	0.22	0	1	0	0.41	1.35	2.82
REGIRPFRATE	0.21	0.24	0.265	0.21	0.02	-0.30	1.54
REGITPAJDRATE	0.08	0.1	0.11	0.06	0.03	-1.94	6.37
NOINHERITTAX	0.22	0	1	0	0.42	1.33	2.76
NOGIFTTAX	0.18	0	1	0	0.38	1.67	3.80
FORAL	0.06	0	1	0	0.24	3.63	14.21
PUBLICSECTOR	0.87	1	1	0	0.34	-2.20	5.82
REDISTRIBUTION	0.80	1	1	0	0.40	-1.47	3.15
POPULARPARTY	0.29	0	1	0	0.45	0.92	1.85
AGE	48.80	48	90	18	17.14	0.15	2.12
FEMALE	0.51	1	1	0	0.50	-0.05	1.00
COUPLE	0.61	1	1	0	0.49	-0.47	1.22
INMIGRANT	0.03	0	1	0	0.17	5.48	31.04
BIGCITY	0.29	0	1	0	0.45	0.93	1.87
RURAL	0.22	0	1	0	0.41	1.36	2.84
TERTEDUCATION	0.17	0	1	0	0.38	1.75	4.07
SECEDUCATION	0.60	1	1	0	0.49	-0.42	1.18
BUSINESS	0.11	0	1	0	0.31	2.48	7.17
RETIRED	0.24	0	1	0	0.43	1.22	2.50
UNIVERSITY	0.06	0	1	0	0.24	3.72	14.86
SALARIED	0.38	0	1	0	0.48	0.50	1.25

\* In each column, the value of the descriptive statistics that corresponds to the alternative definition of certain tax variables (according to the peculiarities in the Basque Country tax attribution) is indicated by means of a second figure: see subsection 6.2.

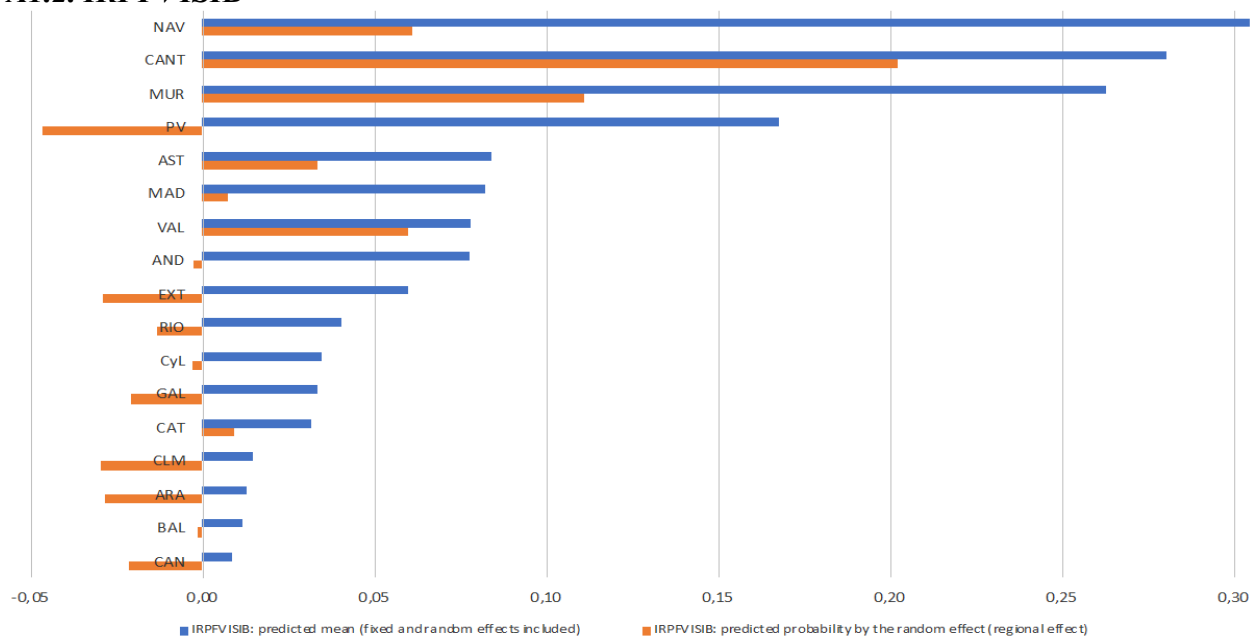
Source: Author's elaboration.

**Figures A1. Predicted Probabilities for the Endogenous Variables (Multilevel Models),  
Baseline Scenario**

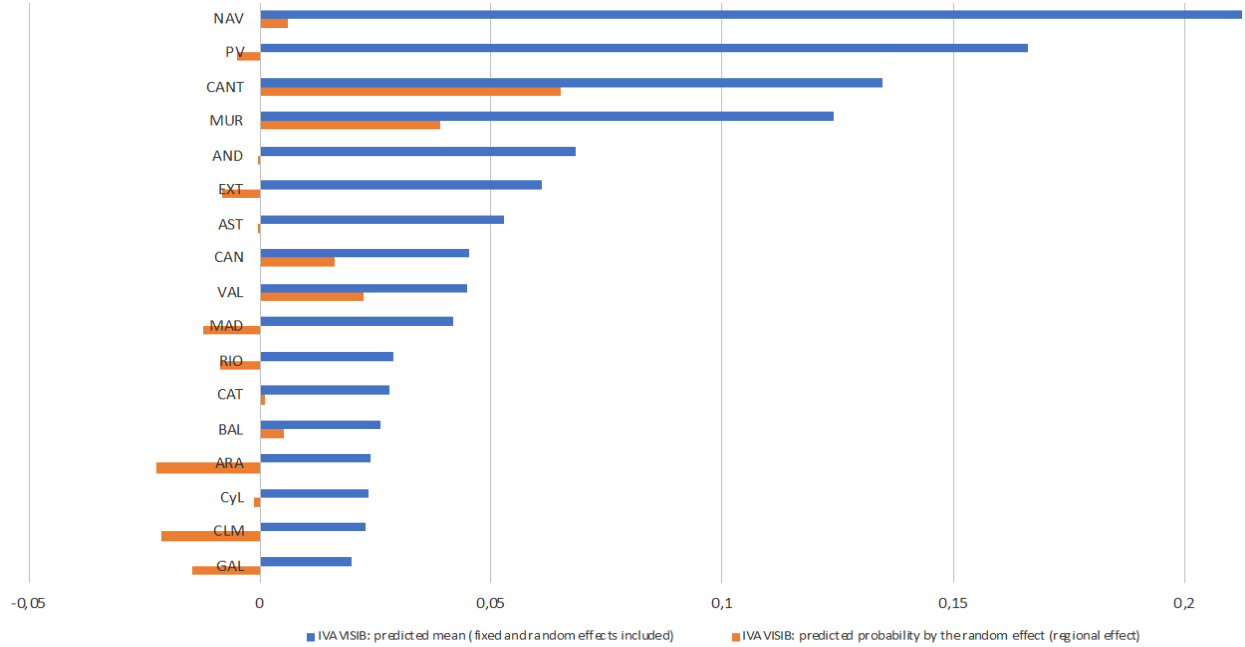
### ***A1.1. ISVISIB***



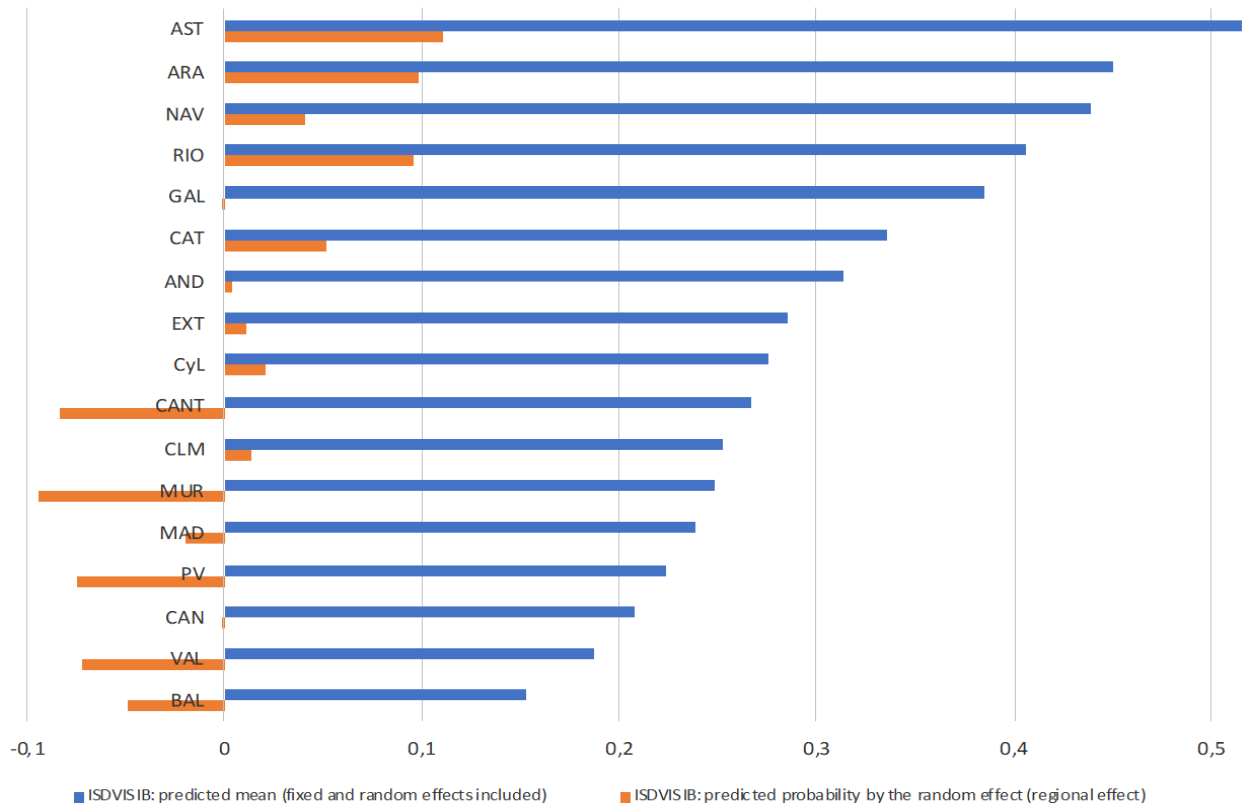
### ***A1.2. IRPFVISIB***



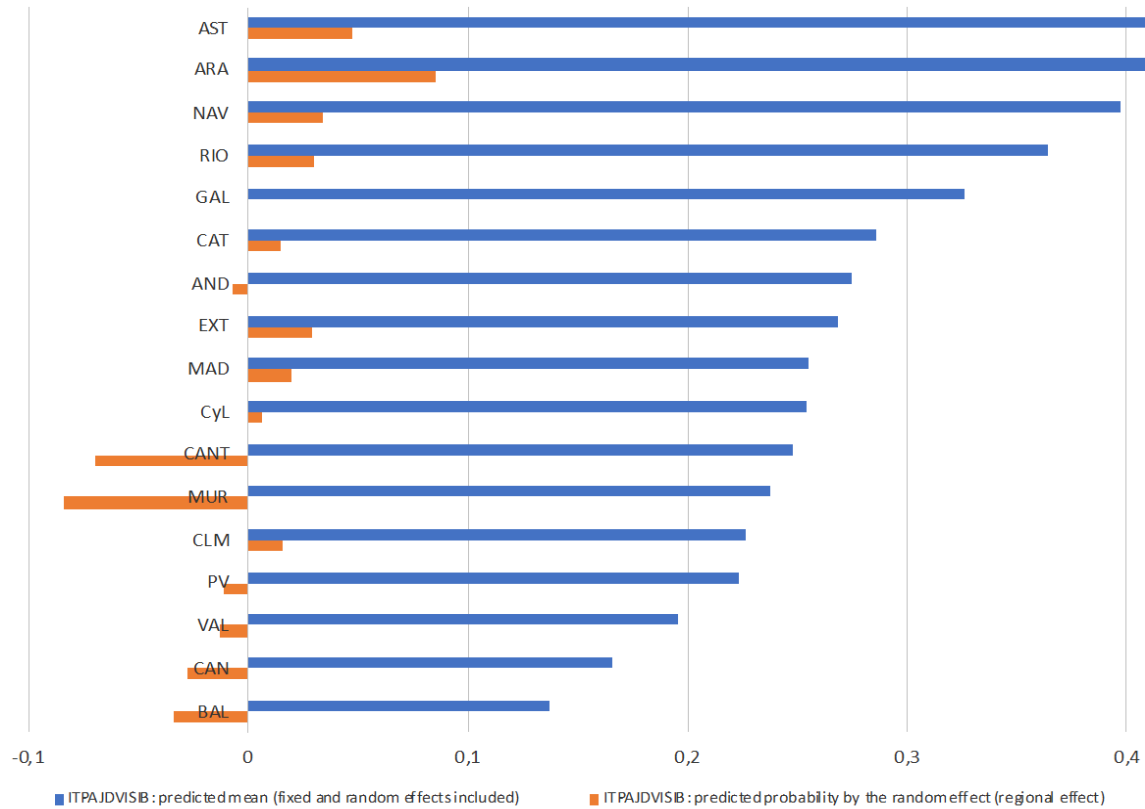
### A1.3. IVAVISIB



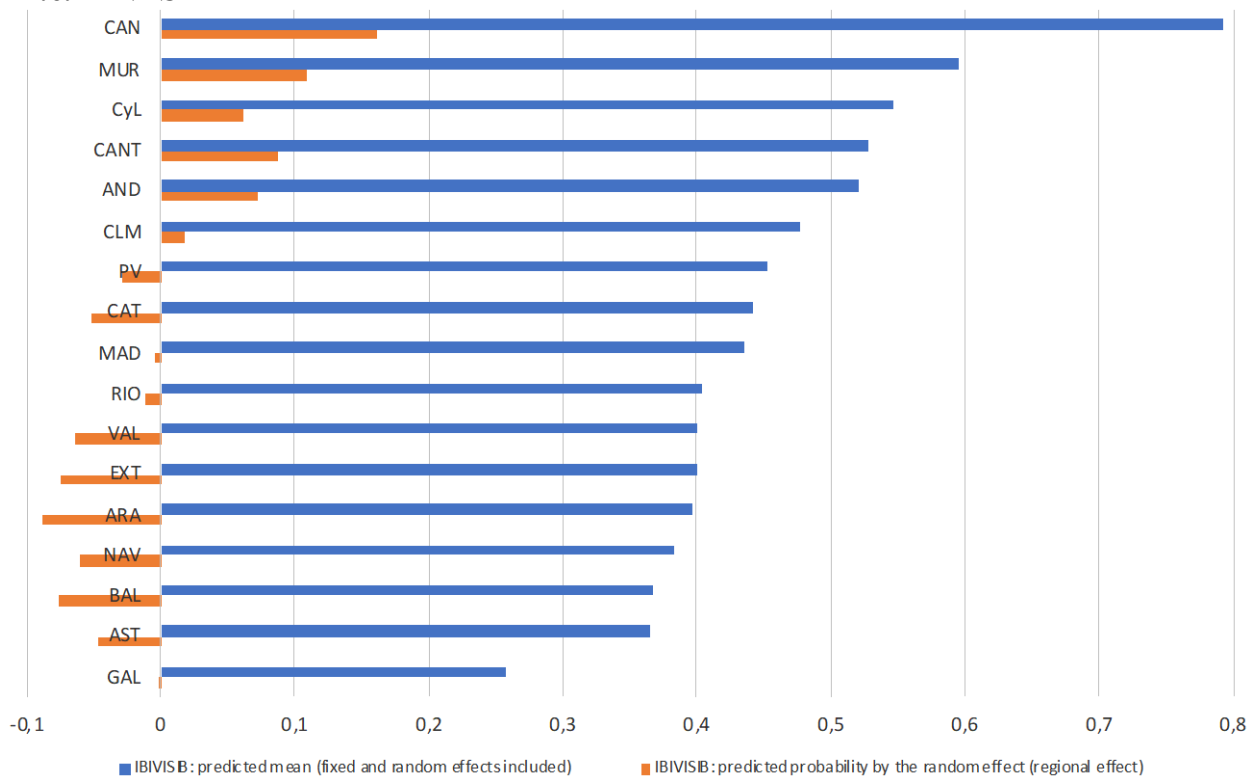
### A1.4. ISDVISIB



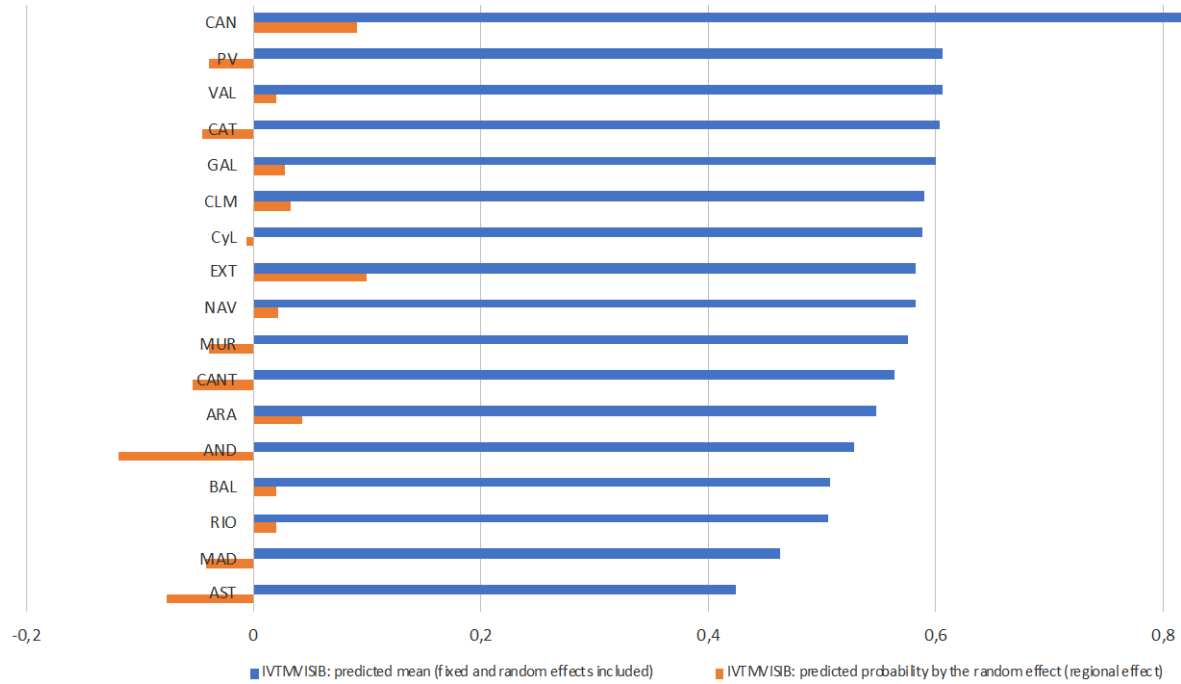
### A1.5. ITPAJDVISIB



### A1.6. IBIVISIB



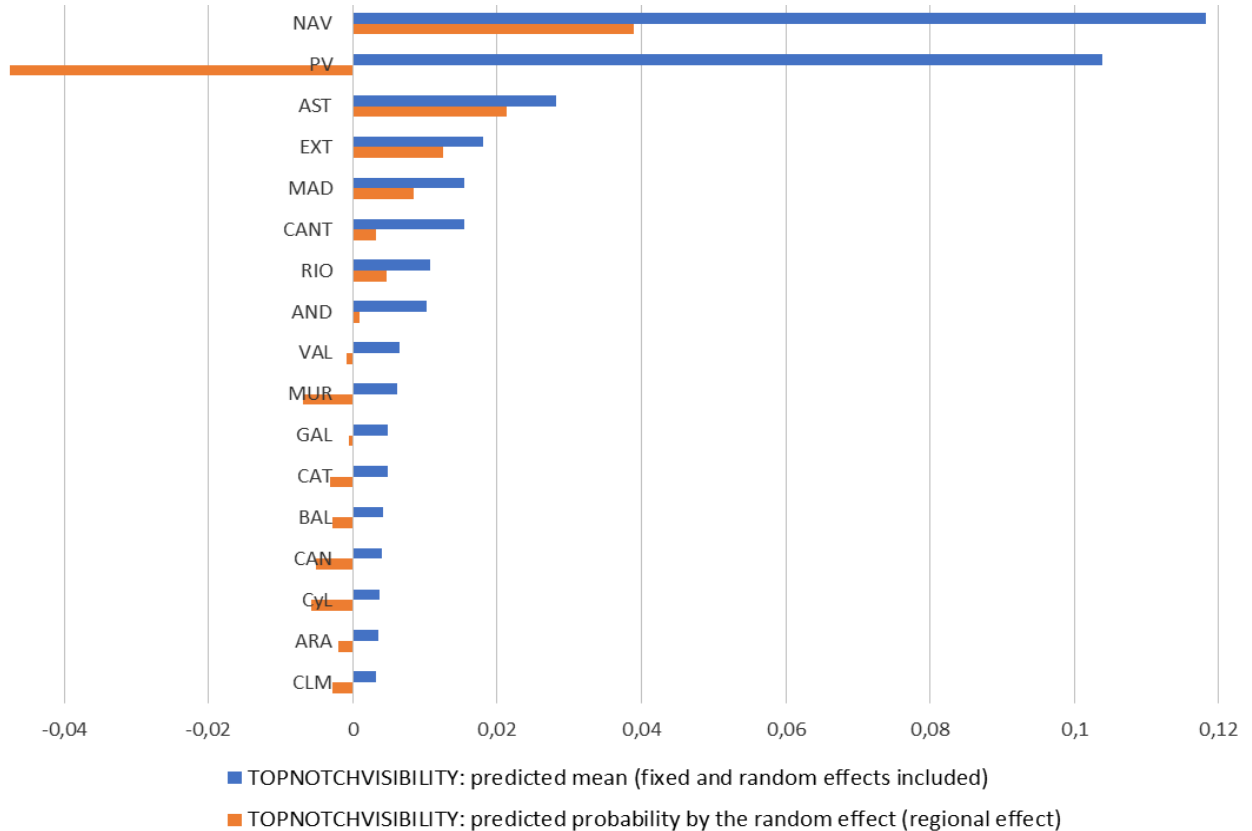
### A1.7. IVTMVISIB



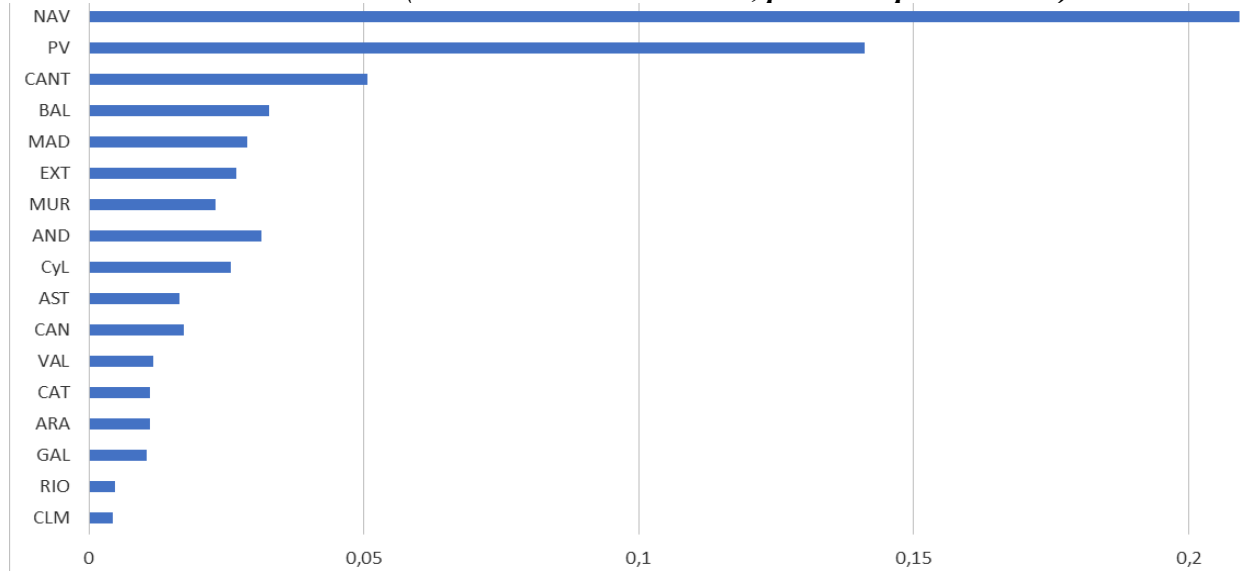
Source: Authors' elaboration.

**Figures A2. Predicted Probabilities for the Endogenous Variables (Multilevel Models).  
Citizens with High Tax Visibility**

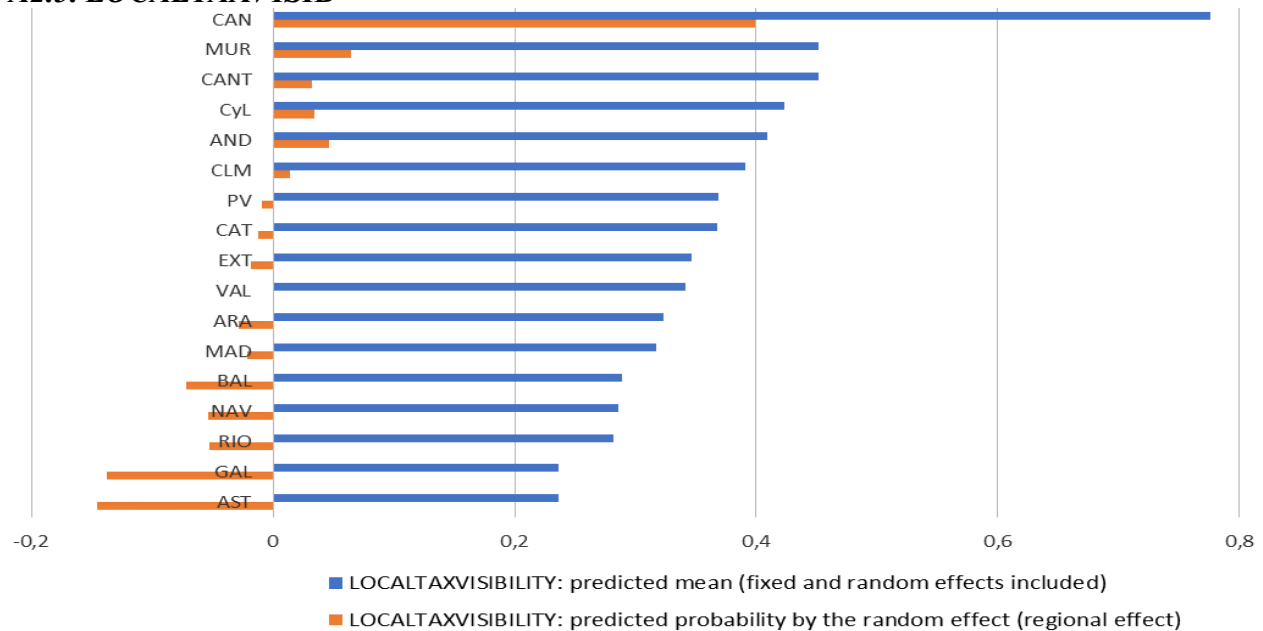
### A2.1. TOPNOTCHVISIB



### A2.2. *REGIONALTAXVISIB* (non-multilevel estimation, predicted probabilities)



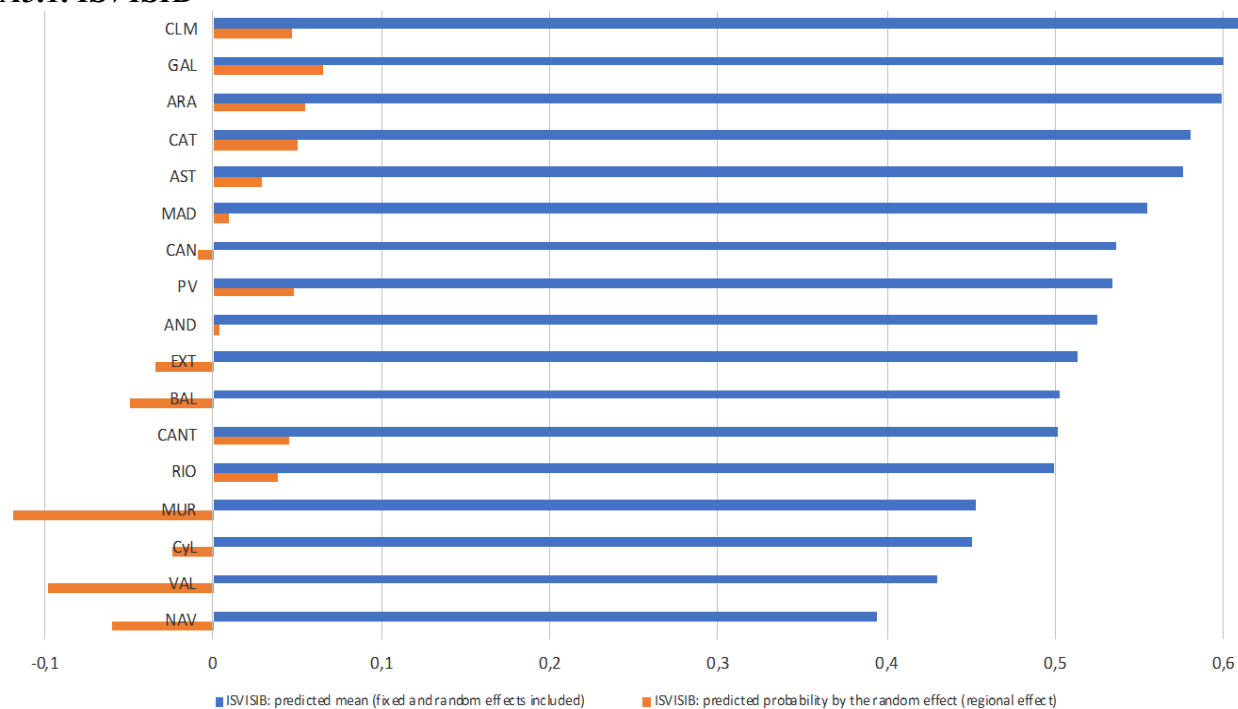
### A2.3. *LOCALTAXVISIB*



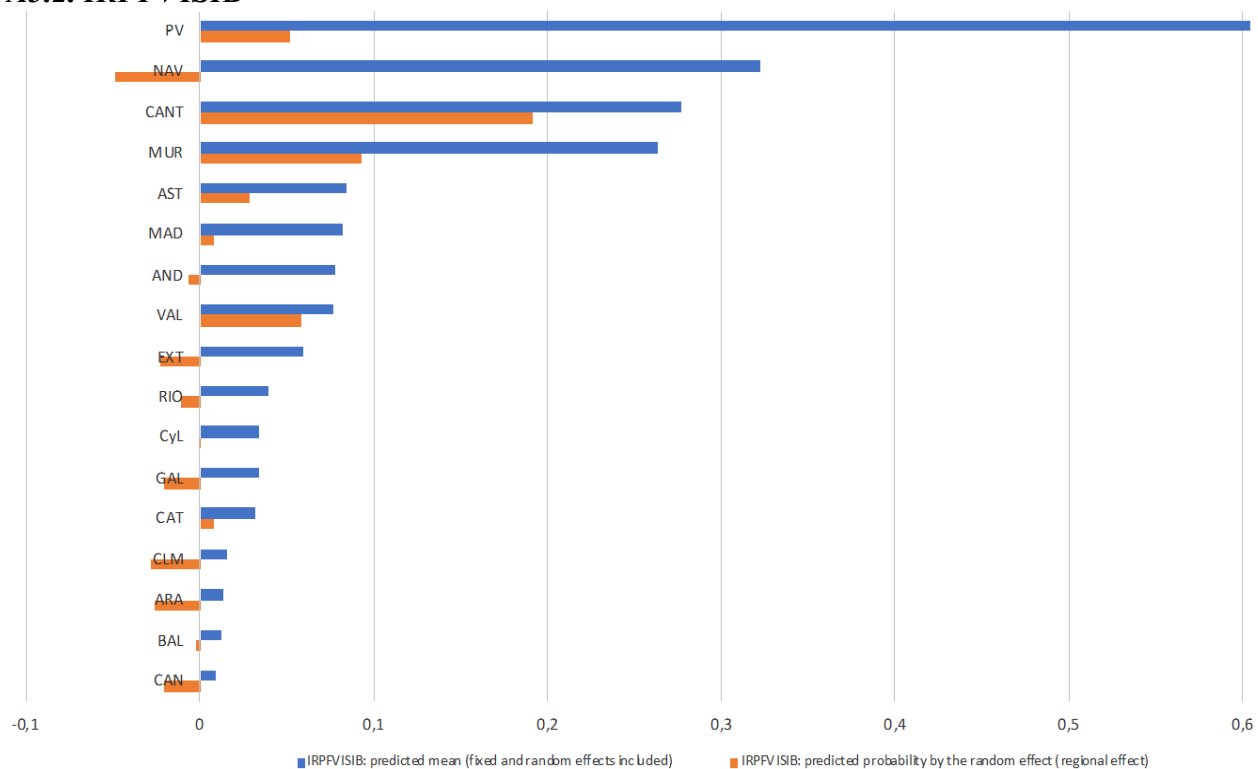
Source: Authors' elaboration.

**Figures A3. Predicted Probabilities for the Endogenous Variables (Multilevel Models).  
Alternative Definitions for the Endogenous Variables of Basque Country Citizens**

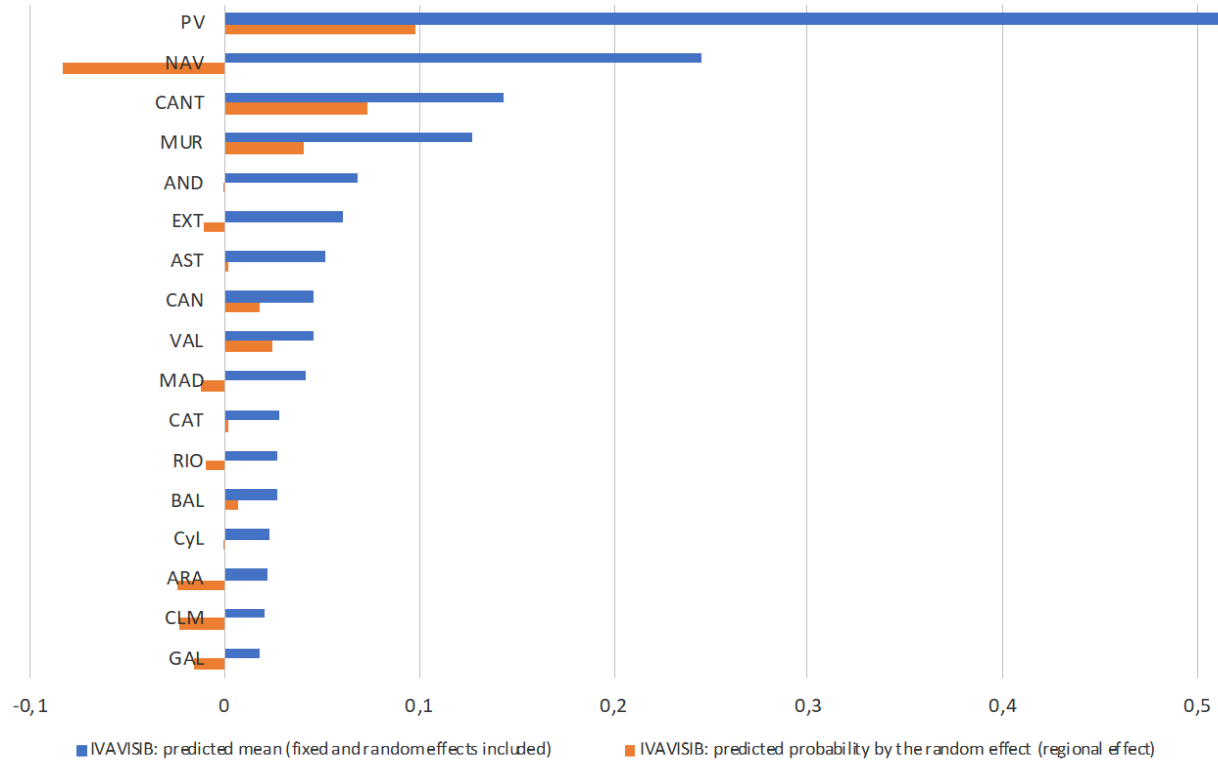
**A3.1. ISVISIB**



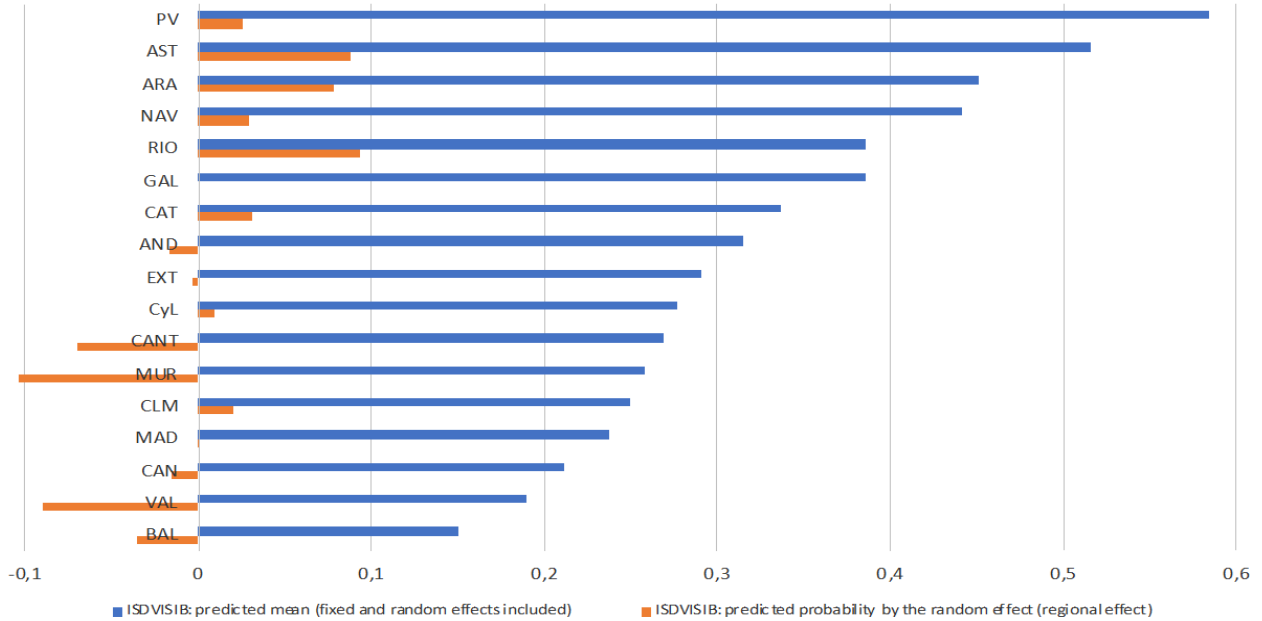
**A3.2. IRPFVISIB**



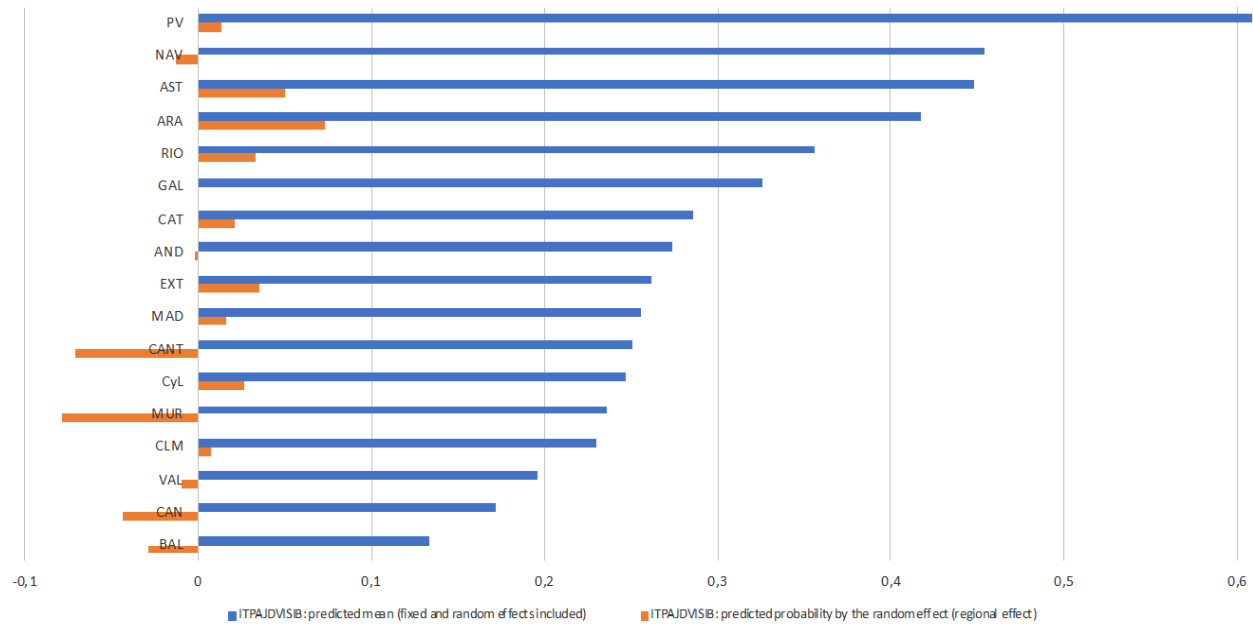
### A3.3. IVAVISIB



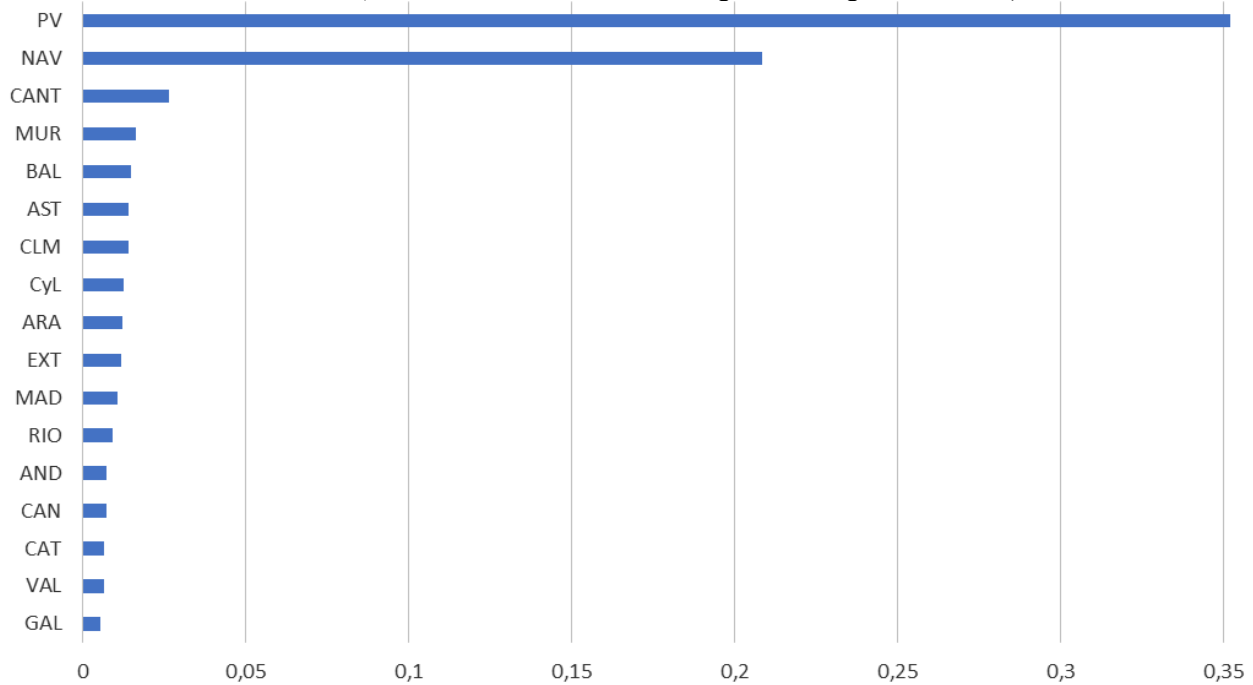
### A3.4. ISDVISIB



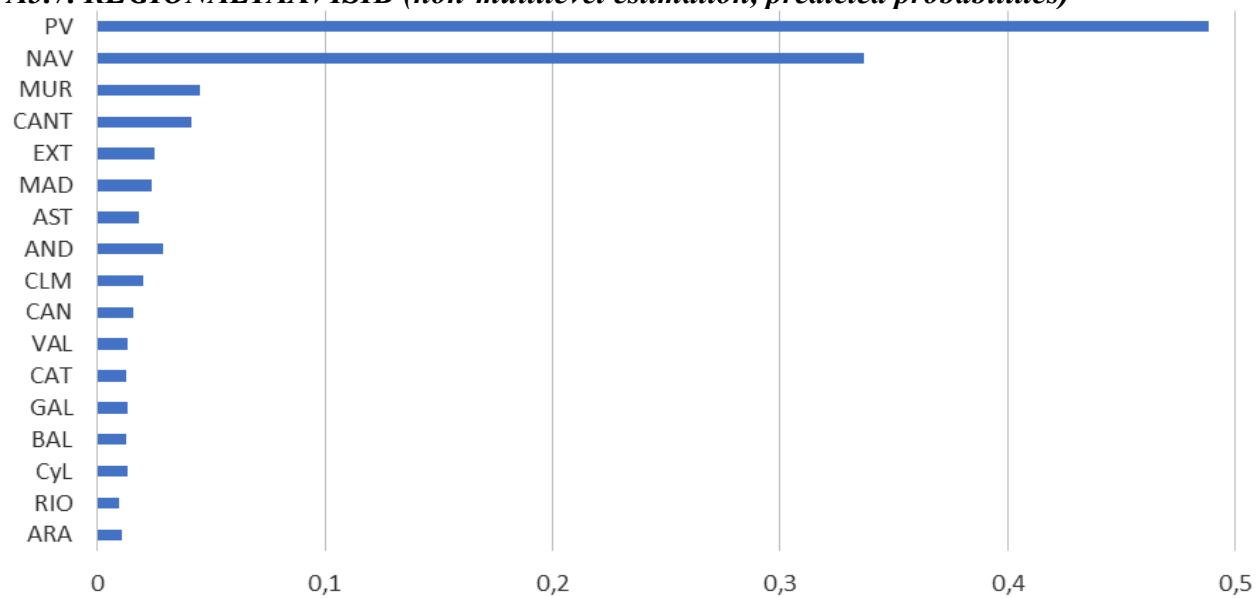
### A3.5. ITPAJDVISIB



### A.3.6. TOPNOTCHVISIB (non-multilevel estimation, predicted probabilities)



**A3.7. REGIONALTAXVISIB (non-multilevel estimation, predicted probabilities)**



Source: Authors' elaboration.